

JPRS-CST-87-037

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28 OCTOBER 1987



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SCIENCE & TECHNOLOGY

CHINA

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LONG-TERM MASS-SPECTROMETRIC SAMPLING TECHNIQUE FOR SEALED GAS LASERS

40090080 Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese Vol 15
No 4, Jul 87 pp 40-43

[English abstract of article by Wang Yuzhi [3769 2948 4249], et al., of
Chengdu Institute of Radio Engineering]

[Text] A new gas-sampling technique for long-term (lifetime) mass-spectrometric analysis of sealed gas lasers is presented. Using a self-made new valve--an ultramini-flow valve of the planar type--and a quadrupole mass spectrometric system, the authors investigated the lifetime process of a CO₂ gas laser, discovering some meaningful phenomena. It is pointed out that the adsorption of gas due to the sputtering of the cathode material is the main reason for the failure of the laser tube.

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VISUALIZATION OF UHF ACOUSTIC TRAVELING WAVEFRONT BY CW LASER--THEORY AND
EXPERIMENT OF SPATIAL AND TEMPORAL INFORMATION CORRELATION OF LASER

Beijing SHENGXUE XUEBAO [ACTA ACUSTICA] in Chinese Vol 12 No 4, Jul 87
pp 253-261

[English abstract of article by Yi Ming [2496 2494], et al., of Nanjing
University]

[Text] Using a spatial and temporal information correlation theory, which differs from the idea of traditional stroboscope geometric imaging formation, the authors describe how to obtain the optical phase figure of a UHF acoustic traveling wavefront in space using a CW laser beam and convert it into an amplitude figure. The authors also describe that there are temporal frequency spectra in spatial frequency spectra, and summarize methods for producing a two-dimensional high contrast optical figure of the acoustic traveling wavefront using correct spatial filtering concepts.

Some interesting results have been obtained: The authors have been successful in obtaining results for a 37.5 MHz ultrasonic traveling wave from a SAW device. The method is in real time and is simple. The authors think this method holds promise for research involving ultrasonic waves.

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CSO: 4009/75

DYNAMIC CHARACTERISTICS OF MULTI-ELEMENT RESONATORS WITH INTERNAL THERMAL LENS

Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 14 No 6,
20 Jun 87 pp 328-336, 354

[English abstract of article by Lu Baida [0712 4102 6671], et al., of the
Department of Physics, Sichuan University, Chengdu]

[Text] The output parameters, such as beam divergence angle in far-field output power of high power solid state lasers, are variable due to the thermal effect of optical pumping. In this paper, the dynamic characteristics of various stable and critical resonator configurations, e.g., the moving rule of the working point in the g^* -parameter diagram, critical refractive power, critical g^* -parameter, beam radius and external far-field divergence angle, are investigated in detail using an equivalent g^* -parameter resonator. The experimental verifications and their applications are discussed.

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CSO: 4009/76

STUDY OF DYE LASER PUMPED BY ACOUSTO-OPTIC Q-SWITCHED YAG SHG LASER

Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 14 No 6,
20 Jun 87 pp 340-345

[English abstract of article by Wang Shikang [3769 0099 1660], et al., of
Tianjin University]

[Text] The frequency-doubled and Q-switched quasi-cw YAG laser using KTP SHG crystals is a new pumping source for dye lasers. The performance of this system, including efficiency, optimum structure and output bandwidth with different dyes and frequency selection elements, are discussed. Considering the loss characteristics of the frequency selection elements and by obtaining the numerical solution of the multi-wavelength rate equation, the effects of beam round trips through frequency elements in the dye laser cavity on the output linewidth are discussed. The calculations are in agreement with the experimental results.

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CSO: 4009/76

MODELING OF PULSED OXYGEN-IODINE CHEMICAL LASERS

Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 14 No 6,
20 Jun 87 pp 346-350

[English abstract of article by Zhuang Qi [8369 3823], et al., of Dalian
Institute of Chemical Physics, Chinese Academy of Sciences]

[Text] The authors describe the modeling of a pulsed iodine laser that operates by first producing iodine atoms from photodissociation of RI , followed by energy transfer with electronically excited oxygen $O_2(^1\Delta)$. Thirty-five rate processes are considered. Using the Runge-Kutta-Gill integral method in computing, the performances of these oxygen-iodine pulsed lasers are obtained under a series of operating conditions. The results show that this type of pulsed oxygen-iodine chemical laser possesses high chemical efficiency. Increasing the partial pressure of $O_2(^1\Delta)$ is shown to be the major path toward improving the performances.

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CSO: 4009/76

EXPERIMENTAL INVESTIGATION OF OSCILLATOR-AMPLIFIER SYSTEM OF COPPER VAPOR LASERS (II)

Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 14 No 6, 20 Jun 87 pp 355-358

[English abstract of article by Liang Peihui [2733 1014 6540], et al., of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences]

[Text] With an unstable resonator as the oscillator, the authors have made an experimental comparison of laser beam power and divergency between the oscillator, traveling wave amplifier, and injection oscillator-amplifier of copper vapor lasers. It shows that the latter has advantages in efficiency and optical quality. The efficiency is 30 percent higher than that of the oscillator, and the divergency is improved by a factor of 4.5, which is essentially in agreement with geometric optics predictions.

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CSO: 4009/76

LANDAU'S FERMI LIQUID THEORY OF HEAVY-FERMION SUPERCONDUCTING SYSTEMS

Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 36 No 6, Jun 87
pp 790-795

[English abstract of article by Feng Shiping [7458 0013 1627] of the Department of Physics and Institute of Low Energy Nuclear Physics, Beijing Normal University]

[Text] The author has established an approximate relationship between the parameters of the periodic Anderson model Hamiltonian and Landau's phenomenological parameters, and applied it to heavy-fermion superconducting systems. Calculation results are in agreement with experimental results qualitatively. The author concludes that superconducting systems induced by heavy-fermion liquid interaction are P-wave type systems.

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CSO: 4009/74

EFFECT OF DIAGONAL DISORDER ON SUPERCONDUCTIVITY IN TRIPLET BIPOLARONIC SYSTEM

Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 36 No 6, Jun 87
pp 796-800

[English abstract of article by Li Yanmin [0632 1750 3046] of the Institute of Physics, Chinese Academy of Sciences; Zhang Liyuan [4545 4539 3293] of the Department of Physics, Beijing University]

[Text] The effect of diagonal disorder on the superconductivity of the triplet bipolaronic system with a two-delta random site energy distribution is analyzed in the framework of the mean-field approximation. It is found that this kind of disorder strongly affects the superconductivity of the system. When the triplet bipolaron concentration is near one-half, the transition temperature decreases seriously, while when the concentration is small, the normal random site energy cannot impede the occurrence of superconductivity completely. This results from the tunneling motion of triplet bipolarons. Therefore, it is expected that superconductivity may appear in some amorphous semiconductors with low bipolaron concentration.

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CSO: 4009/74

HIGH T_c SUPERCONDUCTIVITY OF $(Ba, Y)CuO_3$

40090084 Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS] in Chinese Vol 9 No 2, Jun 87 pp 85-87

[English abstract of article by Zhang Qirui [1728 0366 3843], et al., of the Physics Department, University of Science and Technology of China; Chen Zuyao [7115 4371 5069], et al., of the Applied Chemistry Department, University of Science and Technology of China; Zhou Guien [0719 6311 1869] of the Center of Structural and Compositional Analysis, University of Science and Technology of China]

[Text] The occurrence of high T_c superconductivity with $T_c = 90K$ was observed in $(Ba, Y)CuO_3$ by resistance measurement. The temperature dependence of resistivity deviates significantly from linearity at 130K. The superconducting transition temperature T_c with zero resistivity is 68K, $T_c(\text{mid}) = 90K$, and $\Delta T_c = 4K$. The resistance drops more than four orders of magnitude during the superconducting-normal transition. The results reported are reproducible after several heat cycles from 4.2 to 300 and/or have been stored in liquid nitrogen for one week.

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SUPERCONDUCTING PROPERTIES OF MULTIFILAMENTARY $\text{Nb}_3\text{Sn}(\text{Ti})$ COMPOSITE WIRES MADE BY BRONZE PROCESS

40090084 Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS] in Chinese Vol 9 No 2, Jun 87 pp 117-121

[English abstract of article by Shan Deqin [0830 1795 3830], et al., of Baoji Institute for Nonferrous Metal Research]

[Text] A description is made of the superconducting properties of 55x55 core multifilamentary $\text{Nb}/\text{Cu}-7.4\text{Sn}-(0.5, 0.6)\text{Ti}$ composite wires made from a bronze process. The optimized values of the critical current densities J_c (Bronze + Nb) are as follows: 300 A/mm^2 and 133 A/mm^2 at 16T and 20T, 4.2K, respectively, for $\text{Nb}/\text{Cu}-7.4\text{Sn}-0.6$ at percent Ti composite wires; 119 A/mm^2 and 219 A/mm^2 at 4.2K and 1.8K, 20T, respectively, for $\text{Nb}/\text{Cu}-7.4\text{Sn}-0.5\text{Ti}$ wires. Superconducting critical temperature T_c ranges from 17.30 K to 17.45 K. Up-critical fields B_{c2*} are 26.0-26.8 T and 29 T at 4.2K and 2K, respectively.

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RELATIONSHIP BETWEEN F_0 , J_c AND PLATE-LIKE α -Ti PRECIPITATES IN NbTi SUPER-CONDUCTORS

40090084 Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS] in Chinese Vol 9 No 2, Jun 87 pp 122-127

[English abstract of article by Wang Keguang [3769 0344 0342], et al., of Baoji Institute for Nonferrous Metal Research]

[Text] Presented in this paper are the expressions, derived from Matsushita's statistical theory and the local free energy density function, for the pinning force and critical current density with plate-like α -Ti precipitates in the NbTi superconductor. In these expressions, F_0 and J_c are functions for the increase in the volume fraction of α -Ti and are in proportion to the square root of the α -Ti average thickness. F_0 and J_c will have their maximum values when the α -Ti average separation is approximately equal to the space of the fluxoid. The calculated values are in agreement with the measured results.

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REALIZING ALL SIX SUPERCONDUCTIVE TRANSITION POINTS OF SRM767a DEVICE

40090084 Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS]
in Chinese Vol 9 No 2, Jun 87 pp 139-143

[English abstract of article by Lin Peng [2651 7720], et al., of the Cryogenic Laboratory, Chinese Academy of Sciences, Beijing; Xia Jiansheng [1115 0256 3932], et al., of the Department of Physics, University of Science and Technology of China, Hefei]

[Text] All six superconductive transition points, i.e., niobium, lead, indium, aluminum, zinc and cadmium, in a SRM767a device have been realized on a dilution refrigerator using an accurate mutual inductance bridge. The change in mutual inductance, ΔM , and the transition width w are given. T_c values have been compared with the temperature values shown by three GRTs from Lake Shore Cryotronics, Inc.

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INFLUENCE OF EXCHANGE INTERACTION BETWEEN ELECTRONS ON JUMP IN ELECTRONIC HEAT CAPACITY IN SUPERCONDUCTING METALS

40090084 Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS] in Chinese Vol 9 No 2, Jun 87 pp 148-153

[English abstract of article by Jin Guangxing [6855 0342 2502], et al., of the Department of Physics, Yanbian University, Jilin]

[Text] The authors have quantitatively estimated the influence of exchange interaction between electrons of some superconducting metals on the jump in the electronic heat capacity given in previous articles. The results show that the jump in heat capacity ($C_S - C_N$ for V and Al metals increases due to the exchange interaction by 1.35 and 0.45 mJ/mol·K, respectively, while the $\Delta(C_S - C_N)$ of In is reduced due to the exchange interaction by 1.41 mJ/mol·K.

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SPECIFIC HEAT AND SUPERCONDUCTIVITY OF SOLID SOLUTION Nb-Ti-Zr SYSTEM

40090084 Beijing DIWEN WULI XUEBAO [CHINESE JOURNAL OF LOW TEMPERATURE PHYSICS]
in Chinese Vol 9 No 2, Jun 87 pp 154-159

[English abstract of article by Shen Zhigong [3088 1807 1562], et al., of the
Institute of Physics, Chinese Academy of Sciences, Beijing]

[Text] In this paper, the specific heat of the ternary solid solution Nb-Ti-Zr system is presented. Based on the measured data, the charge transfer model is used to analyze the change in the superconductivity transition temperature. The results of the theoretical treatment agree with the observed data qualitatively, and the quantitative discrepancy between them is probably caused by the α Ti- β Ti transformation.

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TRANSIENT CURRENT IN DOPING-MODULATED AMORPHOUS SEMICONDUCTOR SUPERLATTICES.
(I) MOTION OF CARRIERS UNDER STATIC ELECTRIC FIELD

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8
No 3, May 87 pp 225-235

[English abstract of article by Xiong Shijie [3574 6108 2638] of the Department
of Physics, Institute of Solid State Physics, Nanjing University]

[Text] The motion of carriers in amorphous semiconductor superlattices under
longitudinal bias voltage is discussed. By use of a layered CTRW model with
static bias field, the expression for the time dependent probability of
carrier distribution and the formula for transient current due to the motion
of the carrier are obtained. These may serve the purpose of further investiga-
tion of the photoconductivity in such materials. (Paper received 7 Jul 86.)

REFERENCES

- [1] B. Abeles and T. Tiedje, *Phys. Rev. Lett.*, **51**, 2003(1983).
- [2] M. Hirose and S. Miyazaki, *J. Non-Cryst. Solids*, **66**, 327(1984).
- [3] H. Muneoka and H. Kukimoto, *Jpn. J. Appl. Phys.*, **22**, 6544(1983); H. Muneoka, M. Mizuta and H. Kukimoto, *J. Non-Cryst. Solids*, **59 & 60**, 345(1983).
- [4] 陈治明、王建农、梅向阳、孔光临, *半导体学报*, **7**, 331(1986).
- [5] L. Esaki, *J. Cryst. Growth*, **52**, 227(1981).
- [6] G. H. Dohler, H. Kunzel and K. Ploog, *Phys. Rev.*, **B25**, 2616(1982).
- [7] T. Tiedje, B. Abeles, P. D. Persans, B. G. Brooks and G. D. Cody, *J. Non-Cryst. Solids*, **66**, 345(1984).
- [8] B. Abeles, T. Tiedje, K. S. Liang, H. W. Deckman, H. C. Stasiewski and J. C. Scanlon, *J. Non-Cryst. Solids*, **66**, 351(1984).
- [9] M. Hundhausen and L. Ley and R. Carius, *Phys. Rev. Lett.*, **53**, 1598(1984).
- [10] J. Kakalios and H. Fritzsche, *Phys. Rev. Lett.*, **53**, 1602(1984).
- [11] M. Hundhausen and L. Ley, *Phys. Rev.*, **B32**, 6655(1985).
- [12] H. Scher and E. W. Montroll, *Phys. Rev.*, **B12**, 2455(1975).
- [13] J. Klafter and R. Silbey, *Phys. Rev. Lett.*, **44**, 55(1980).
- [14] K. L. Ngai and F. S. Liu, *Phys. Rev.*, **B24**, 1049(1981).
- [15] A. Blumen and G. Zumofen, *J. Chem. Phys.*, **75**, 892(1981).
- [16] A. Blumen, J. Klafter and G. Zumofen, *Phys. Rev.*, **B27**, 3429(1983).
- [17] A. Blumen, *Phys. Rev. Lett.*, **53**, 1301(1984).
- [18] 熊诗杰, *物理学报*, **35**, 1010(1986).
- [19] 熊诗杰, 调制掺杂非晶半导体超晶格中的瞬变电流 (II).

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CSO: 4009/1120

METHODS OF TITANIUM SILICIDE THIN FILM FORMATION BY SOLID STATE INTERACTION AND THEIR PROPERTIES

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8 No 3, May 87 pp 247-253

[English abstract of article by Hong Feng [3163 8688], et al., of the Department of Electronic Engineering, Fudan University; Zhang Qiangji [1728 1730 1015], et al., of the Department of Physics, Fudan University]

[Text] Methods of titanium silicide thin film formation by solid state interaction and the thin films' properties are studied. During the annealing process of the Ti/Si system, oxygen contamination is of importance in affecting the silicide formation. A method to reduce oxygen contamination with a surface capsulation layer and form good titanium silicide thin film is suggested. Highly conductive TiSi_2 thin films can be obtained after thermal annealing at an appropriate temperature. X-ray diffraction patterns show that there exists obvious preferential orientation grain growth during the high temperature interaction. Auger depth profiles show that oxygen atoms redistribute in the Ti/Si system during the high temperature annealing process. The surface capsulation layer is effective in preventing the residual oxygen from participating in the silicide formation, and it plays a significant role in the preferential orientation grain growth and oxygen redistribution. (Paper received 18 Jan 86.)

REFERENCES

- [1] A. K. Sinha, J. A. Cooper, Jr. and H. J. Levinstin, *IEEE Electronic Device Letters*, EDL-3, 90(1982).
- [2] S. P. Murarka, *Silicide for VLSI Applications*, p. 7, Academic Press, New York, (1983).
- [3] M. Y. Tsai, et al., *Semiconductor Silicon/1981*, edited by H. R. Huff, et al., (Electrochemical Society, Pennington, New Jersey 1981) p. 573.
- [4] T. J. Hwang, S. H. Rogers, B. Z. Li, *J. of Electronic Materials*, 12, 667(1983).
- [5] S. P. Murarka, *Silicide for VLSI Applications*, p. 92 Academic Press, New York, (1983).
- [6] B. Z. Li, R. E. Jones, Jr. K. Daneshvar and J. Davis, *J. Appl. Phys.* 56, 1242(1984).
- [7] Li Bingzong, et al., *Proceeding of ADVANTECH 84*, Shanghai, p. 16(1984).
- [8] S. P. Murarka, *Silicide for VLSI Applications*, p. 79 (Academic Press, New York, 1983).
- [9] V. Malhotra, T. L. Martin and J. E. Mahan, *J. Vac. Sci. Technol.* B2, 10(1984).
- [10] P. Merchant, Jun Amano, *Workshop on Refractory Metal Silicides for VLSI (2)*, San Juan Bautista, California, May 1984.

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CSO: 4009/1120

FORMATION OF SILICIDES IN Ti/Si AND Ti/SiO₂/Si SYSTEMS

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8
No 3, May 87 pp 254-260

[English abstract of article by Li Baoqi [2621 1405 7496], et al., of the
Institute of Semiconductors, Chinese Academy of Sciences]

[Text] Reactions at the Ti/Si and Ti/SiO₂/Si interface under the conditions of steady-state thermal annealing and CW-Ar⁺ laser annealing have been studied using a variety of techniques, including AES, XPS, RBS and X-ray diffraction. Ti thin films on silicon have been transformed to Ti₅Si₃, TiSi and TiSi₂ after steady-state annealing at 500-600°C, and only TiSi₂ can be observed after annealing above 650°C. In the case of the Ti/SiO₂/Si system, Ti₅Si₃ thin film with a TiO overlayer has been formed in the temperature range of 750-1000°C. The growth of the TiSi₂ layer on silicon and Ti₅Si₃ layer on SiO₂ shows a diffusion-limited behavior, i.e., $x \propto t^{1/2}$.

CW-Ar⁺ laser scanned annealing can induce the solid-phase reaction of Ti/Si at a power density of less than 2.7 kW/cm², but the liquid-phase reaction is induced at a power density of about 3.8 kW/cm². A mixture of TiSi₂ and pure Si was observed after the liquid-phase reaction. Experimental results are also discussed. (Paper received 13 Feb 86.)

REFERENCES

- [1] K. N. Tu and J. W. Mayer, in "Thin Films-Interdiffusion and Reactions", edited by J. M. Poate, K. N. Tu, and J. W. Mayer (Wiley, New York, 1978), p. 359.
- [2] S. P. Muraka, "Silicides for VLSI Application" (New York, 1983)
- [3] Marc-A Nicolet and S. S. Lau, in "VLSI Electronics, Microstructure Science", Vol. 6 edited by N. G. Einspruch and G. B. Tarrabce Chap. 6 (1983).
- [4] H. Kato and Y. Nakamura, *Thin Solid Films*, **34**, 135(1976).
- [5] JER-SHEN MAA, *Thin Solid Films*, **64**, 439(1979).
- [6] K. N. Tu, J. F. Ziegler and C. J. Kircher, *Appl. Phys. Lett.*, **23**, 493(1973).
- [7] H. Krautle, M-A Nicolet and J. W. Mayer, *J. Appl. Phys.*, **45**, 3304(1974).
- [8] R. M. Walser and Bene, *Appl. Phys. Lett.*, **28**, 624(1976).
- [9] 李宝琪, 中国科学院半导体研究所硕士研究生毕业论文 (1985).
- [10] "Handbook of X-ray Photoelectron Spectroscopy", Perkin-Elmer, Corporation Physical Electronics Division, edited by C. D. Wagner.
- [11] A. Hiraki, *J. Electrochem. Soc.*, **27**, 2662(1980).

LSIS-II AUTOMATIC LAYOUT DESIGN SYSTEM

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8
No 3, May 87 pp 270-276

[English abstract of article by Zhuang Wenjun [8369 2429 0689], et al., of the
Institute of Semiconductors, Chinese Academy of Sciences]

[Text] LSIS-II is a system applied to automatic layout design of the LSI/VLSI chip. The model used in the system is polycell with marcocell. The main parts of the system are as follows: hierarchical describing language of the layout design and its compiler; two-graded cell library and its management sub-system; verification for design description; placement; global routing; routing; physical design; output exchange and interactive design sub-system. (Paper received 17 Feb 86.)

REFERENCES

- [1] C. P. Hsu, B. N. Tien, K. Chow *et al.*, Proc. 22nd D. A. Conf., pp. 443—448, 1985.
- [2] H. Anway *et al.*, Proc. 22nd D. A. Conf., pp. 449—452, 1985.
- [3] H. Terai *et al.*, Proc. 22nd D. A. Conf., pp. 503—508, 1985.
- [4] G. Persky *et al.*, *J. Des. Automat. Fault-Tolerant Comput.*, 1, 217(1977).
- [5] H. Beke, *et al.*, Proc. 16th D. A. Conf., pp. 102—108, 1979.
- [6] K. W. Koller, *et al.*, Proc. 14th D. A. Conf., pp. 153—157, 1977.
- [7] 庄文君, 计算机学报, 7, 217(1984).
- [8] 程可行, 庄文君, 半导体学报, 5, 422(1984).
- [9] 庄文君、程可行, ICCAS, pp. 57—60, 1985.
- [10] 程可行、庄文君, 半导体学报, 7, 412(1986).
- [11] 高春华、庄文君, 半导体学报, 7, 284(1986).

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CSO: 4009/1120

IDENTIFICATION OF E(0.37) AND E(0.62) LEVELS IN Pd-DOPED SILICON

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8 No 3, May 87 pp 277-282

[English abstract of article by Zhou Jie [0719 3381], et al., of the Institute of Semiconductors, Chinese Academy of Sciences]

[Text] Based on the fact that the energy levels $E_{TA}(0.37)$ and $E_{TB}(0.62)$ have been proven to be related to interstitial Pd in silicon and to have respectively different charge states (0/+) and (+/++) belonging to the same center, further experimental investigation reveals that the center is a complex with associated boron. (Paper received 21 Feb 86.)

REFERENCES

- [1] 阮圣央,周洁,张砚华,吉秀江,郑秉茹,李树英,杨锡权,谭飞,半导体学报, 5, 266 (1984).
- [2] H.Lefevre and M.Schulz, *Appl. Phys.*, 12, 45 (1977).
- [3] 周洁,阮圣央,郝红,葛惟钺,吉秀江,李树英, *Chinese Phys. Lett* 3, 5 (1986).
- [4] E. K. Weber, *Appl. Phys. A*, 30, 1 (1983).

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CSO: 4009/1120

INVESTIGATION OF DOUBLE ACCEPTOR STATES IN P-TYPE LEC-GaAs

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8 No 3, May 87 pp 283-290

[English abstract of article by Jiang Desheng [3068 1795 3932], et al., of the Institute of Semiconductors, Chinese Academy of Sciences]

[Text] Two groups of low temperature ($T \leq 40\text{K}$) IR absorption peaks are observed for the As-grown samples, cutting respectively from the top and tail parts of an ingot of undoped P-type LEC-GaAs. The peaks at the higher frequency region are identified as due to intracenter transitions of a singly ionized acceptor with an energy level of $E_v + 200\text{ meV}$, as previously reported in the case of the Si-doped or electron-irradiated P-type LEC GaAs. In addition, the absorption due to electronic transitions from the ground state to $2p_{5/2}(\Gamma_8)$ and $2p_{5/2}(\Gamma_7)$ states, the absorption due to the ground state to $3p_{3/2}$ state is observed.

The photoluminescence at 4K and temperature-dependent Hall measurements confirm that there are double acceptors ($E_A = 78\text{ meV}$ and 200 meV) existing in the undoped P-type LEC GaAs throughout the ingot. The concentration increases along the direction of crystal growth. The authors' results support the suggestion that the double acceptors are due to Ga_{As} antisite defects. (Paper received 22 Feb 86.)

REFERENCES

- [1] J. A. Van Vechten, *J. Electrochem. Soc.*, **122**, 419(1975).
- [2] P. W. Yu, W. C. Mitchel, M. G. Mier, S. S. Li and W. L. Wang *Appl. Phys. Lett.*, **41**, 532(1982).
- [3] S. G. Bishop, B. V. Shanabrook and W. J. Moore, *J. Appl. Phys.*, **56**, 1785(1984); W. J. Moore B. V. Shanabrook and T. A. Kennedy, in "Semi-in-sulating 3-5 Compounds", p. 453(1984); B. V. Shanabrook et al. *ibid.* p. 302(1984).
- [4] K. R. Elliot, D. E. Holms, D. E. Chen and C. G. Kirpatrick, *Appl. Phys. Lett.*, **40**, 898(1982); K. R. Elliot, *Appl. Phys. Lett.*, **42**, 274(1983).
- [5] 江德生、宋春英、郑捷飞、许振嘉. <红外研究> **3**, 4(1984).
- [6] G. A. Gledhill, R. C. Newman and J. J. Woodhead *J. Phys. C Solid State Phys.*, **17**, L301(1984).
- [7] R. F. Kirkman, R. H. Stradling and P. J. Lin-Chung, *J. Phys. C Solid State Phys.*, **11**, 419(1978).
- [8] T. Baldreschi, N. O. Lipari, *Phys. Rev.*, **B9**, 1525(1973).
- [9] G. B. Bechlet, G. A. Baratt and M. Schultze, *Phys. Rev.*, **B24**, 915(1981).

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CSO: 4009/1120

PHYSICAL BEHAVIOR OF Pd IN p-Si

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8
No 3, May 87 pp 312-315

[English abstract of article by Zhou Jie [0719 3381], et al., of the Institute
of Semiconductors, Chinese Academy of Sciences]

[Text] The physical behavior of Pd in p-type silicon is reported. The nature
of its two main energy levels H(0.16) and H(0.33) is preliminarily identified.
(Paper received 21 Feb 86.)

REFERENCES

- [1] M. S. Yunusov and N. A. Tursunov, *Sov. Phys. Semicond.*, **8**, 47 (1974). J. A. Pals, *Solid State Electron.*, **17**, 1139 (1974).
Lingkon So and Sorab K. Ghandhi, *Solid State Electron.* **20**, 113 (1977).
- [2] 阮圣央 周洁 张砚华 吉秀江 郑秉茹 李树英 杨锡权 谭飞 半导体学报, **5**, 266(1984).
- [3] H. Lefevre and M. Schulz, *Appl. Phys.*, **12**, 45 (1977).
- [4] 周洁 阮圣央 郝红 葛惟棍 吉秀江 李树英, *Chinese Phys. Lett.*, **3**, 5(1986).
- [5] E. K. Weber, *Appl. Phys.*, **A30**, 1 (1983).

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CSO: 4009/1120

INVESTIGATIONS OF LOW TEMPERATURE CONDUCTIVITY AND STAEBLER-WRONSKI EFFECT IN a-Si:H

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8 No 3, May 87 pp 321-324

[English abstract of article by Zhou Jianghuai [0719 3068 3232], et al., of the Institute of Semiconductors, Chinese Academy of Sciences]

[Text] The measurements of the effect of light soaking on the conductivity (SWE) in undoped GD a-Si:H films have been made over a wide temperature range from 100K to 430K. It is found for the first time that the hopping conductivity remains almost unchanged after prolonged exposure of the samples to white light (200 mW/cm²), although the extended state conductivity decreases dramatically as generally observed. A discussion of the creation mechanism of the SWE is given based on the results. (Paper received 5 Mar 86.)

REFERENCES

- [1] D. L. Staebler and C. R. Wronski, *Appl. Phys. Lett.*, 31, 292(1977).
- [2] N. F. Mott, *J. Non-cryst. Solids*, 1, 1(1968), *Phil. Mag.*, 19, 835(1969).
- [3] I. Solomon and T. Dietl, *J. de Phys.*, 39, 1241(1973).
- [4] M. Yamaguchi and H. Fritzsche, *J. Appl. Phys.*, 56, 2303(1984).

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CSO: 4009/1120

MINORITY CARRIER LIFETIME CONTROL BY ELECTRON IRRADIATION FOR POWER SWITCHING TRANSISTORS

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8 No 3, May 87 pp 325-328

[English abstract of article by Chai Tianen [2693 1131 1869], et al., of Shanxi Institute of Mechanical Engineering; Zheng Jiye [6774 4949 5030], et al., of Weiguang Factory of Electronic Devices]

[Text] The effects of electron irradiation on the minority carrier lifetime, DC gain, saturation voltage drop and switching time of the power switching transistors are discussed based on irradiation experiments. It is shown that the lifetime of minority carriers can be precisely controlled by dosage adjustment. By choosing a proper dosage, one can obtain the transistors with promised parameters, thus remarkable improving switching properties and simplifying the device design by adoption of electron irradiation processing. (Paper received 14 Oct 85; finalized 6 Nov 86.)

REFERENCES

- [1] R. O. Carlson, Y. S. Son. *IEEE-ED* 24, 1104 (1977).
- [2] 浙江大学半导体器件教研室编, 晶体管原理, 105~106, 249, 国防工业出版社 (1980年6月第一版).

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CSO: 4009/1120

INVESTIGATION OF EXCITONIC PROPERTIES AND TEMPERATURE BEHAVIOR OF PHOTO-LUMINESCENCE FROM GaAs-GaAlAs MULTIPLE QUANTUM WELL STRUCTURES

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8 No 3, May 87 pp 329-333

[English abstract of article by Xu Zhongying [1776 0112 5391], et al., of the Institute of Semiconductors, Chinese Academy of Sciences]

[Text] The detailed excitonic properties and temperature behavior of photoluminescence from GaAs-GaAlAs multiple quantum well structures have been studied. MQW of high quality has been found to have narrow spectral lines at low temperatures and keeps excitonic luminescence properties in the wide temperature range of from low temperatures to room temperature. The competition between electron-heavy hole recombinations from the narrower wells and that from the wider wells has been observed for the first time. (Paper received 13 Oct 86.)

REFERENCES

- [1] R. Dingle, *Proceedings of 13th International Conf. on Phys. of Semiconductors* (North-Holland, Amsterdam), 965, (1976).
- [2] R. C. Miller, D. A. Kleinman, W. A. Nordland, Jr., and A. C. Gossard, *Phys. Rev.*, **B22**, 863(1980).
- [3] 徐仲英、葛惟琨, *物理*, **15**, 311(1986).
- [4] P. Dawson, G. Duggen, H. I. Ralph and K. Woodbridge, *Phys. Rev.*, **B28**, 7381(1983).
- [5] J. E. Fouquet and A. E. Seigman, *Appl. Phys. Lett.*, **46**, 280(1985).
- [6] R. C. Greene and K. K. Bajaj, *Solid State Communications*, **45**, 831(1983).
- [7] M. Tanaka, H. Sakaki, J. Yoshino and T. Furuta, *Surface Sciences*, **174**, 65(1986).
- [8] D. C. Reynolds, K. K. Bajaj, C. W. Litton, P. W. Yu, J. Singh, W. T. Masselink, R. Fischer, and H. Mor-koc, *Appl. Phys. Lett.* **46**, 51(1985).
- [9] 黄昆, *物理*, **15**, 329(1986).

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CSO: 4009/1120

CONTOUR-BASED MOTION ANALYSIS

40090080 Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese Vol 15
No 4, Jul 87 pp 9-14

[English abstract of article by Wu Zhongquan [0702 0022 2973] of Qinghua
University; Beijing Institute of Aeronautics and Astronautics]

[Text] A contour-based approach to motion analysis is introduced. It is based first on calculating the motion at image corners, and then propagating the corner motion estimates along the principal contours in the image based on a local $2\frac{1}{2}$ -D motion assumption by dynamic programming. The results of several experiments show that the optical flow field is globally consistent with the principal contours.

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CALCULATIONS OF DC CHARACTERISTICS, MICROWAVE AND NOISE PARAMETERS OF HEMT

40090080 Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese Vol 15
No 4, Jul 87 pp 15-23

[English abstract of article by Wei Cijun [7614 4595 6511] of the Institute
of Semiconductors, Chinese Academy of Sciences]

[Text] A comprehensive analysis involving the calculations of DC characteristics, microwave and noise parameters of HEMT is given. A modified charge-control model taking into account the effects of $n_s \sim \epsilon_F$ dependence is utilized. The DC characteristics are calculated using a saturation model with a minor modification when the negative mobility model is involved. Analytical formulas for M-W behavior and intrinsic noise parameters are derived, and the Fukui coefficient (K_F) is 50 ~ 70 percent smaller than that of GaAs MESFET.

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PROPERTIES OF AMORPHOUS GdTbFe FILM FOR MAGNETO-OPTICAL RECORDING

Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 36 No 6, Jun 87
pp 705-711

[English abstract of article by Wang Yinjun [3769 5593 0689], et al., of the
Institute of Physics, Chinese Academy of Sciences]

[Text] Prepared using bias magnetron-sputtering, the deposited GdTbFe films possess suitable parameters for magneto-optical recording. The perpendicular anisotropy constant K_u increases with an increase in bias voltage. Using the plots from both the Johnson-Mehl-Avrami equation and the Kissinger equation, the parameters of crystallization kinetics, $\Delta E = 2.0$ eV and $n = 1$, have been determined for amorphous $Gd_{27}Tb_{10}Fe_{63}$ film. The crystallization temperature and active energy ΔE of the amorphous $Gd_{27}Tb_{10}Fe_{63}$ film are greater than those for binary systems, e.g., GdCo, GdFe. The isothermal annealing of amorphous $Gd_{27}Tb_{10}Fe_{63}$ film at various temperatures shows that it has a good thermal stability, which is required for magneto-optical recording application.

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CSO: 4009/74

VACUUM ULTRAVIOLET SPECTRA OF CT-6B TOKAMAK PLASMA

Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 36 No 6, Jun 87
pp 712-716

[English abstract of article by Wang Wenshu [3769 2429 2579], et al., of the Institute of Physics, Chinese Academy of Sciences; Huang Mao [7806 4243] of the Department of Physics, Branch School of Beijing University]

[Text] A spectrographic survey of the impurity lines was made on the CT-6B Tokamak with a 1 meter grazing incidence spectrograph. The observed wavelength ranges were from 1580 to 550 Å and from 460 to 43 Å, using 300 lines/mm and 1200 lines/mm gratings respectively. The survey revealed that the main impurities in the CT-6B Tokamak plasma are Mo for high Z impurities and C, N and O for low Z impurities. There are a large number of OV and OVI lines with intense emission. The authors also observed MoVIII resonance lines 234.314 Å, 235.510 Å and 237.215 Å. The shortest observed wavelengths are the second order of OVII lines 21.6020 Å and 21804 Å. The first order of these two lines is situated beyond the film and cannot be recorded. According to the features of the spectra and the ionization potentials of OV and OVI as well as MoVII, the average electron temperature for the CT-6B Tokamak is estimated to be about 140 eV. Oxygen is the main impurity in the CT-6B Tokamak, and its lines emission is the main portion of the energy loss in the CT-6B Tokamak. Lines of the main components of the vacuum-vessel material, such as Fe, Cr, Ni and Ti, have not been found.

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CSO: 4009/74

STUDY OF HEAT TRANSPORT IN TOKAMAK PLASMA FROM SOFT X-RAY SAWTOOTH OSCILLATION

Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 36 No 6, Jun 87
pp 717-724

[English abstract of article by Yang Xuanzong [2799 1357 1350], et al., of the
Institute of Physics, Chinese Academy of Sciences]

[Text] Soft X-ray emissions and their fluctuations in the CT-6B Tokamak have been detected using a Au(Si) surface barrier detector array. The empirical scaling law for soft X-ray sawtooth oscillations in the center of the plasma during an internal disruption period is given in this paper. The electron thermal transport phenomena, such as electron heating rate, electron energy balance, electron energy confinement time, current density distribution and electron temperature in the center of the plasma during internal disruption, are studied from soft X-ray sawtooth oscillation observations.

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CSO: 4009/74

WHITE HOLES AND THEIR THERMODYNAMICS

Beijing TIAN TI WU LI XUE BAO [ACTA ASTROPHYSICA SINICA] in Chinese Vol 7 No 3,
Jul 87 pp 177-188

[English abstract of article by Gui Yuanxing [2710 0337 2502] of the Department
of Physics, Dalian Institute of Technology]

[Text] Black and white holes are to be expected from the theory of general relativity. Now, the existence of black holes is commonly agreed on, but that of white holes is arguable. This paper discussed the thermodynamics of white holes. The author points out that a white hole can follow the generalized second law of thermodynamics when it satisfies some conditions.

First of all, the author derives an expression of the first law of white hole mechanics for the mass of a stationary axisymmetric solution of the Einstein equations containing a white hole. The differential formula is

$$\delta M = Q_H \delta J_H + \frac{1}{8\pi} \kappa \delta A \quad (1)$$

These derivations and results are similar to those of black holes.

Similar to the Hawking radiation of the black hole, the author derives the results of "Hawking absorption" for white holes in curved-space quantum field theory. A classical white hole can emit, but it does not absorb. However, a quantum white hole cannot only emit classically, but also absorb like a black body at temperature $T_w = \frac{\kappa}{2\kappa_B}$, with the temperature T_w called the white hole's temperature.

It is easy to give the zeroth law--the surface gravity κ of a stationary white hole is constant over the absolute particle horizon, and the third law--it is impossible by any procedure, no matter how idealized, to reduce κ to zero by a finite sequence of operation.

It is difficult to discuss the second law of white hole thermodynamics. Some-one concluded that a white hole cannot follow the second law since, because a system containing black holes follows the second law, its generalized entropy

does not decrease with time, i.e., $\Delta S_B + \Delta S_m \geq 0$; a white hole is a time-reverse of a black hole, so the generalized entropy of a white hole system must not increase with time, i.e., $\Delta S_W + \Delta S_m \leq 0$; this is a strongly anti-thermodynamic behavior. This is why the author believes that this cannot be true: If a time-reverse of any black hole process gave a possible white hole process, the above conclusion would be true. But, in fact, the time-reverse of some processes of a black hole cannot give a possible process of a white hole. For this reason, for a quantum black hole to follow the generalized second law does not imply that a quantum white hole must destroy the second law. Whether a quantum white hole follows the second law depends on the concrete outside conditions.

As a special example, the author considers a Schwarzschild white hole in empty space. Suppose now that the white hole bursts in such a way that it emits black body radiation at an unknown temperature T (it must not equal T_W). The author calculates that the change of the generalized entropy in this case is

$$\langle \Delta S_g \rangle = \langle \Delta S_w \rangle + \langle \Delta S_m \rangle = \alpha + \sum \frac{\beta - \frac{\hbar\omega}{T_w}}{e^{\hbar\omega/T} \mp 1} \quad (2)$$

It can be proven that there is a critical temperature T_C which is a finite temperature, $T_W < T_C < \infty$. When the white hole bursts at the temperature $T < T_C$, then the generalized second law of thermodynamics can be satisfied with this process.

Nothing has been known before about a white hole burst. Now the author suggests that a bursting white hole ought to follow the second law. This will lead to two inferences: i) A white hole bursts at a finite temperature $T < T_C$. ii) Because the temperature T at which the white hole bursts is higher than the temperature T_B of a black hole with the same mass, the white hole's lifetime will be shorter than the black hole's. Because the temperature T is finite, the white hole will have a lifetime long enough to compare with the lifetime of the universe. This offers a possible explanation for the problem of the bursting time of lagging cores.

9717

CSO: 4009/71

NEW PHOTOELECTRIC PHOTOMETER FOR 60CM TELESCOPE OF BEIJING OBSERVATORY

Beijing TIAN TI WULI XUEBAO [ACTA ASTROPHYSICA SINICA] in Chinese Vol 7 No 3,
Jul 87 pp 230-237

[English abstract of article by Shi Chunming [4258 2504 2494], et al., of
Beijing Observatory]

[Text] This paper describes a new photoelectric photometer controlled by a microcomputer. The filters, stars and sky background can be changed by the computer according to the preset control on the keyboard. The photometer is used for real-time data acquisition, processing and display during observations. It can carry out two kinds of work: one is photon-counting and the other is DC amplifying-V/F converting. The authors present one typical light curve obtained with this photometer which has been routinely used since 16 November 1983. The standard error of the magnitude difference between comparison stars and check stars is smaller than 0.003 mag. The color system can be transformed into the international standard UBV system and the uvby system.

9717

CSO: 4009/71

METHOD FOR DETERMINING POSITION ACCURACY OF LARGE SATELLITE PHOTOGRAPHIC
TELESCOPE

40090083 Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS]
in Chinese Vol 8 No 1, 1987 pp 56-61

[English abstract of article by Huang Chushan [7806 2806 3790] of Nanjing
Astronomical Instrument Factory, Chinese Academy of Sciences]

[Text] This paper describes a method for determining the position accuracy
of large photographic telescopes in satellite observation. With this method,
the determination of position accuracy of a large satellite photographic
telescope recently made by Nanjing Astronomical Instrument Factory was
completed. Preliminary results are as follows: position accuracy observed
with a fixed telescope was $m = \pm 2.06''$, while that observed with a tracking
telescope was $m = \pm 1.32''$.

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PERTURBATION CONVERSE SOLUTION FOR OPTIMAL DYNAMIC DESIGN AND ITS APPLICATION

Dalian DALIAN GONGXUEYUAN XUEBAO [JOURNAL OF DALIAN INSTITUTE OF TECHNOLOGY]
in Chinese Vol 26 No 1, Mar 87 pp 71-78

[English abstract of article by Teng Hongfei [3326 1738 7378], et al., of the
Department of Mechanical Engineering, Dalian Institute of Technology]

[Text] In this paper, an optimal dynamic design method, based on the idea of
perturbation characteristics of generalized eigenvalues and converse solution,
is presented. Using this method, the problems of optimal dynamic designs
having unacceptable frequency bands (involving a eigenvalue equation with
implicit behavior constraints) can be solved.

The idea of this method is that, as soon as the behavior constraints of an
unacceptable frequency band are violated, an unacceptable band of the evading
variable is set. By means of the perturbation characteristic of generalized
eigenvalues and the known frequency increment that can lead to the unacceptable
frequency band being avoided, the changes in the elements of the stiffness
matrix and the mass matrix in the eigenvalue equation can conversely be
calculated. Then, the changes of the design variables can be determined,
thereby achieving the goal of avoiding the unacceptable frequency band. There-
fore, the eigenvalue equation solution with implicit behavior constraints
can be avoided to the greatest possible extent. At the same time, the optimal
problem can be solved by transforming the behavior constraints into boundary
ones. Therefore, both the method and the programming of optimal dynamic design
are simplified and the times of re-analyses are reduced. The theoretical
evidence in which the same eigenvalue does not appear as previously (called the
duplicate eigenvalue) during the course of optimization after setting the
unacceptable band of the avoided variable under certain conditions is given,
as are some conditions in which no duplicate eigenvalues appear. Following
the presentation of this method, a practical example of aero engine rotor
optimal dynamic design with 25 design variables is given. The optimal value
can be achieved by nonlinear programming combined with the perturbation
converse solution method. This leads to five to six re-analyses times. In
addition, the authors give an optimal dynamic design of a centrifugal pump.
It requires three to five re-analyses times. This method can also be extended
to optimal dynamic structural design. (Paper received 7 Nov 84; finalized
18 Nov 85.)

REFERENCES

- 1 林家浩. 轴系的动力优化设计. 机械工程学报 1982; 18(1): 69—78
- 2 米成秋, 孙靖民. 机床部件有限元—优化设计. 哈尔滨工业大学学报 1982; (2): 72—84
- 3 郑伟中. 外圆磨床砂轮架的动态优化设计. 机床振动与噪音 1984; (1): 65—71
- 4 林家浩. 结构动力优化设计发展综述. 力学进展 1983; 13(4): 423—430
- 5 滕弘飞, 冯恩民, 邢玉生. 轴承系统动力优化设计, 大连工学院学报 1984; 23(2): 119—124
- 6 滕弘飞, 阳明盛. 一个低维有效的无约束优化方法——三叉支法. 大连工学院学报 1982; 21(4): 211—214
- 7 Bazara Mokntar S, Sherry C M. *Nonlinear programming theory and algorithms*. New york: John wiley & Sons, 1979
- 8 Fox R L. *Optimization methods for engineering design*. Reading Massachu-
setts: Addison-Wesley, 1971: 242—247
- 9 曹志浩. 矩阵计算和方程求根. 北京: 高等教育出版社, 1979
- 10 程耿东. 工程结构优化设计基础. 北京: 水力电力出版社, 1983: 111—116

9717

CSO: 4009/1117

STUDY OF LAW OF CHANGE IN FUEL FILM THICKNESS--THEORY OF FILM-SPACE ATOMIZATION COMBUSTION (PART 2)

Dalian DALIAN GONGXUEYUAN XUEBAO [JOURNAL OF DALIAN INSTITUTE OF TECHNOLOGY] in Chinese Vol 26 No 1, Mar 87 pp 87-94

[English abstract of article by Zhou Jingwei [0719 4842 4885], et al., of the Institute of Internal Combustion Engines, Dalian Institute of Technology]

[Text] This paper, applying the dynamic measuring technique of the fuel film thickness and its device under combustion developed by the Institute of Internal Combustion Engines of Dalian Institute of Technology, presents the measurement of the law of changes of the fuel film area on the piston top and the ratio of the fuel film area to the piston top area, the fuel film volume and the space atomizing fuel volume and its ratio on a film-space atomization combustion system with direct injection in a ω -type chamber for the Model E150 diesel engine under rated rotating speed and various loads. In addition, some experimental investigations of the main factors contributing to fuel film thickness and its changing rate, i.e., the nozzle's extrusive height, timing of fuel injection, the angle between nozzle sprays and the chamber shape, etc., are presented. (Paper received 29 Dec 85.)

REFERENCES

- 1 周经纬等。油膜厚度测量技术的研究——油膜-雾化燃烧机理研究之一。大连工学院学报 1985, 24 (3): 79—85
- 2 胡国栋。柴油机燃烧研究的展望。大功率柴油机 1982, 1: 1—10
- 3 李约上等。用油膜-雾化燃烧方式改善 E 150 系列柴油机工作性能的研究。大功率柴油机 (1981) 学术年会论文选集 1983
- 4 花向阳。浅 ω 型燃烧室单缸模拟研究分析。大连工学院毕业论文 1981
- 5 朱国朝等。用涂料法测柴油机燃烧室零件表面温度的研究。中国内燃机学会测试技术委员会 (1984) 学术年会论文; 编号: 846032

9717

CSO: 4009/1117

DESIGN OF HIGH-SPEED FFT SIGNAL PROCESSOR

40090083 Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS]
in Chinese Vol 8 No 1, 1987 pp 1-9

[English abstract of article by Liu Jinbo [0491 6855 3134], et al., of the
Institute of Acoustics, Chinese Academy of Sciences]

[Text] A high-speed FFT signal processor, providing various functions, has been developed. The computation time for a 1024 point real power spectrum and the maximum sampling frequency are designed to be 5 ms and 200 KC, respectively. A Base-4 or Base-(4+2) C-T FFT algorithm and block floating-point arithmetic have been adopted. A direct method for preventing the overflow has been carried out using certain hardware. The bit bipolar AM2900 family, a high-speed multiplier TDC-1010 j and RAM 2114, 2147 are used in the processor. The microprogramming is modular, with the specific software module selected to suit the requirements of application. The MZ-80 B and BZ-3541 microcomputers are available for the processor.

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CHARACTERISTICS OF FLOW RATE AND NOISE RADIATION OF EXPANSION MICROPORE MUFFLER

Beijing SHENGXUE XUEBAO [ACTA ACUSTICA] in Chinese Vol 12 No 4, Jul 87
pp 269-276

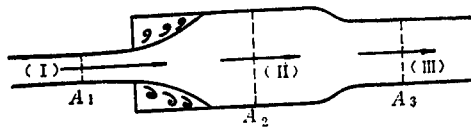
[English abstract of article by Li Peizi [2621 3099 3320], et al., of the
Institute of Acoustics, Chinese Academy of Sciences]

[Text] In the present work, the flow rates and noise radiation of expansion micropore mufflers at different upstream stagnation pressures have been investigated theoretically and experimentally. The authors find that there is a critical expansion ratio which determines flow and noise characteristics. Below this critical point, flow can only be choked at microspores. At any upstream stagnation pressure, the flow Mach number in the muffler is lower than that at the microspores, so the noise produced in the muffler is not significant when compared with that radiated from the microspores. Above the critical point, the flow first chokes at the exhaust exit and then at the microspores. At low upstream stagnation pressure, the noise produced in the muffler cannot be neglected and affects the noise radiation of the muffler, particularly at the pressure at which the flow is choked at the exhaust exit only.

The flow rate is closely related to the effective area defined in the paper, and upstream stagnation pressure. The effective area approaches that of the total microspores as the latter decreases to zero, and approaches the exhaust area as the total microspore area increases. The experimental results agree well with theoretical calculations.

The directivity of noise radiation varies considerably as the number of microspores increases. The noise reduction of an expansion microspore muffler measured by the average A-weighted sound pressure level is different from that of theoretical calculation due to the effect of noise produced in expansion, and is expected to approach theoretical calculations at high upstream stagnation pressure.

There is no doubt from the experiment and calculations at high upstream stagnation pressure that noise reduction of the expansion micropore muffler is slightly higher than the reduction obtained from the frequency shift of the micro-jets.



Schematic diagram of idealized expansion micropore muffler

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CSO: 4009/75

IMPULSE NOISE ASSESSMENT AND EVALUATION

Beijing SHENGXUE XUEBAO [ACTA ACUSTICA] in Chinese Vol 12 No 4, Jul 87
pp 300-311

[English abstract of article by Wang Jiqing [3769 1323 0615] of the Institute of Acoustics, Tongji University]

[Text] Measures used for impulse noise description and evaluation are quite different from those for continuous noise due to their different characteristics. A review of the damage risk criteria, as well as the relation of the community to impulse noise, is presented in this paper, and the evaluation of the hearing protector under impulsive noise environments is also re-examined. Many questions, such as the application of equal-energy rule to impulse noise and the interaction of continuous and impulse noise, are still in dispute. Further investigations, more comprehensively conducted, are expected.

9717

CSO: 4009/75

BLOCKADE CONTOUR FOR MODIFICATION COEFFICIENTS OF INVOLUTE GEARS AND ITS
DRAWING BY MICROCOMPUTER GRAPHICS

Dalian DALIAN GONGXUEYUAN XUEBAO [JOURNAL OF DALIAN INSTITUTE OF TECHNOLOGY]
in Chinese Vol 26 No 1, Mar 87 pp 63-69

[English abstract of article by Zhou Jiakai [0719 1367 2088] of the Teaching
and Research Section of Machine Theory, Dalian Institute of Technology]

[Text] This paper deals with various factors which affect the transmission
qualities of modified involute gears and related mathematical modeling. It is
proposed that the blockade contour be drawn on a microcomputer in order to
select the modification coefficients of the modified involute cylindrical
gears with an arbitrary combination of tooth numbers and made using rack-based
cutters with various tooth profile parameters. (Paper received 19 Dec 85.)

REFERENCES

- 1 朱景梓主编. 渐开线齿轮变位系数的选择. 北京: 人民教育出版社. 1982, 17—88
- 2 Т П БОЛОТОВСКАЯ, И А БОЛОТОВСКИЙ, В Э СМИРНОВ. СПРАВОЧНИК ПО КОРРИГИРОВАНИЮ ЗУБЧАТЫХ КОЛЕС. МОСКВА, МАШГИЗ, 1962: 15—213
- 3 Т П БОЛОТОВСКАЯ et al. СПРАВОЧНИК ПО ГЕОМЕТРИЧЕСКОМУ РАСЧЕТУ ЭВОЛЬВЕНТНЫХ ЗУБЧАТЫХ И ЧЕРВЯЧНЫХ ПЕРЕДАЧ. МОСКВА, МАШГИЗ, 1963: 15—17
- 4 渐开线圆柱齿轮承载能力计算方法国际课题组. 渐开线圆柱齿轮承载能力计算方法 (报批稿). 国家标准总局, 1982: 7—10, 38—42, 50—70
- 5 上海船用柴油机研究所传动室, 齿轮强度计算标准 译文集 83-003 下册. 上海: 上海船用柴油机研究所, 1983: 19—24

9717

CSO: 4009/1117

PRINCIPLE AND METHOD OF FUZZY SETS ON ASSESSMENT OF WATER QUALITY

Dalian DALIAN GONGXUEYUAN XUEBAO [JOURNAL OF DALIAN INSTITUTE OF TECHNOLOGY]
in Chinese Vol 26 No 1, Mar 87 pp 119-125

[English abstract of article by Chen Shouyu [7115 1344 3558] of the Research
Section of Water Resources, Dalian Institute of Technology]

[Text] This paper presents the theoretical model and method of fuzzy multi-
factorial evaluation, such as

$$\underline{A}_f = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{pmatrix} = (a_{kj}), \quad a_{kj} = \frac{\sum_{r=1}^t c_{kj}/s_{jr}}{\sum_{j=1}^n \left(\sum_{r=1}^t c_{kj}/s_{jr} \right)};$$

$$\underline{A}_c = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1m} \\ a_{12} & a_{22} & \cdots & a_{2m} \\ \vdots & \vdots & \vdots & \vdots \\ a_{c1} & a_{c2} & \cdots & a_{cm} \end{pmatrix} = (a_{tk}), \quad a_{tk} = \frac{V_{tk}}{\sum_{t=1}^c V_{tk}}$$

which may be used to assess water quality. (Paper received 29 Sep 86.)

REFERENCES

- 1 陈守煜. 水质分类评价的模糊划分聚类方法. 东北水力发电学报 1987, 3 (2)
- 2 陈守煜, 李桂花. 环境质量分类评价的模糊混合聚类法. 东北水力发电学报 1986, 2 (3)
- 3 李桂花. 二级模糊综合评判模型在水质评价中的应用. 东北水力发电学报 1987, 3 (1)
- 4 汪培庄. 模糊集合论及其应用. 上海科学技术出版社, 1981
- 5 陈守煜等. 水利、水文、水资源与环境模糊集分析. 大连工学院出版社, 1987

9717

CSO: 4009/1117

FORMATION RULE OF PRECIPITATED PHASE IN CAST NICKEL-BASE Ni-Cr-Mo ALLOY AND INFLUENCE OF PRECIPITATES ON CORROSION RESISTANT PROPERTY OF ALLOY

Dalian DALIAN GONGXUEYUAN XUEBAO [JOURNAL OF DALIAN INSTITUTE OF TECHNOLOGY] in Chinese Vol 26 No 1, Mar 87 pp 37-45

[English abstract of article by Li Longsheng [2621 7127 4141], et al., of Dalian Institute of Technology; Yu Yong [0060 0516] of Dalian Acid-Proof Pump Works]

[Text] The authors have used a combination of an optical microscope, X-ray diffraction spectrum, EMPA and TEM to investigate the morphology, composition, structure and formation conditions of the precipitated phase in cast Ni-Cr-Mo containing the Hastelloy-C alloy intended for use in an "oxidation-reduction" composite harsh corrosive medium. The influence of chromium content, the precipitated phase and sensitization time on the corrosion-resistant property of the alloy is seriously researched. Experimental results show that, in the Hastelloy-C alloy, phases of p, μ , M_6C and a small amount of σ precipitate during sensitization in the temperature range from 800°C to 1200°C, and a minimum amount of precipitates is found in the alloy sensitized at 900°C. The larger the amount of precipitates and the greater the richness of Cr and Mo in the precipitates, the poorer the resistance of the alloy to pitting corrosion and intergranular corrosion. A long sensitization time can also decrease the resistance to pitting and intergranular corrosion. However, the degree of general corrosion of the alloy is not remarkably affected. (Paper received 18 Nov 85.)

REFERENCES

- 1 Klein H Joseph *et al.* 秦紫瑞, 李隆盛译. 化工生产用耐蚀合金. 国外金属材料 1981, (7): 13—18
- 2 Streicher M A. Effect of Composition and Structure on Crevice Intergranular and Stress Corrosion of some Wrought Ni-Cr-Mo Alloys. *Corrosion* 1976, 32: 79
- 3 秦紫瑞, 李隆盛, 于勇等. 新型铸造镍基耐蚀合金的研制. 铸造 1985, (2): 40

9717

CSO: 4009/1117

RESEARCH ON CHINESE SPEECH UNDERSTANDING SYSTEM BJD-I

40090080 Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese Vol 15
No 4, Jul 87 pp 1-8, 92

[English abstract of article by Yu Yibiao [0205 0001 1753], et al., of
Northern Jiaotong University, Beijing]

[Text] The Chinese speech understanding system BJD-I, with dialogue capability and used for railway reservations and query services, consists of three parts: (1) Speech Acoustic Processor, (2) Linguistic Processor and (3) Voice Response Processor. In the speech acoustic processor, two algorithms are proposed--one is for voice detection and syllable separation of continuous speech by maximum formant (MFDS), and the other is for fast speed dynamic programming matching of patterns (FSDP). Experiments show that the correct rate of syllable separating for continuous speech by MFDS is above 98 percent. By using the FSDP algorithm, the recognition accuracy is the same as that of the optimized dynamic programming presented by Sako, but the pattern matching speed is twice as fast. In the linguistic processor, a grammar model RSNG (Regular Semantic Network Grammar) for syntax analysis and a knowledge representation method, called tree-structure knowledge representation, are set up. The performance of the BJD-I Chinese speech understanding system has been tested by a human speaker, and the experiment results show that the correct rate of semantic entry recognition is 80 percent, with 98 percent of the service completed.

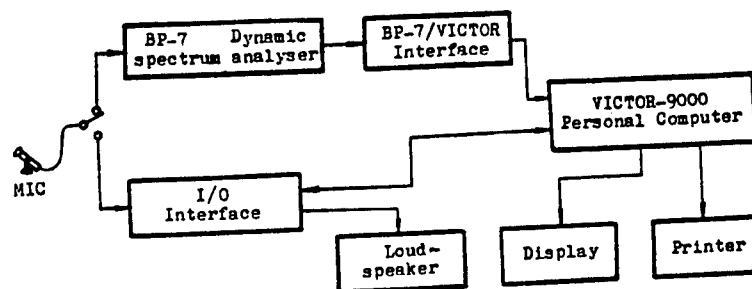


Figure 1. Block diagram of BJD-I system

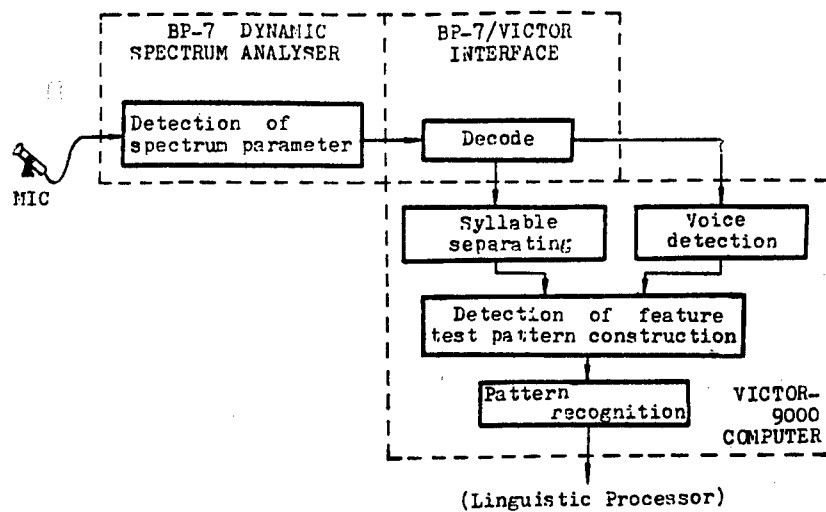


Figure 2. Block diagram of speech acoustic processor

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SOURCES OF BHC AND DDT RESIDUES IN TEA

Beijing HUANJING KEXUE XUEBAO [ACTA SCIENTIAE CIRCUMSTANTIAE] in Chinese Vol 6 No 3, Sep 86 pp 278-285

[English abstract of article by Chen Zongmao [7115 1350 2021], et al., of the Tea Research Institute, Chinese Academy of Agricultural Science; Zhu Jinqing [2612 0193 1987] of Hangzhou Tea Research Institute]

[Text] The sources of BHC and DDT residues in tea have been investigated. Even when the BHC in soils was able to be transferred into tea leaves through the root system and there was a moderate positive correlation between the BHC concentrations in the tea and soil ($\gamma = +0.52$), the main source contributing to the residues of BHC and DDT in tea was not the soil or irrigation water, but instead the air drift caused by the BHC and DDT spray operations on nearby agricultural fields. A laboratory simulation study supported this theory.

9717

CSO: 4009/3038

MODELING OF AIR POLLUTION IN MODERATELY INDUSTRIALIZED CITY

Beijing HUANJING KEXUE XUEBAO [ACTA SCIENTIAE CIRCUMSTANTIAE] in Chinese Vol 7
No 1, Mar 87 pp 93-99

[English abstract of article by Jiang Weimei [5592 4850 2812], et al., of the
Department of Atmospheric Sciences, Nanjing University]

[Text] The meteorological conditions and air pollutant concentrations in the Changzhou area were observed during a 15-month period. A field experiment was carried out to study the meteorological elements and dispersion in the boundary layer. The results show that the Gaussian model is applicable to a moderately industrialized city in a plains area, as long as the model parameters are identified in situ. The calculated results are consistent with those observed. Based on the model, the future air pollution pattern has been predicted.

9717

CSO: 4009/3037

METEOROLOGICAL CONDITIONS OF PHOTOCHEMICAL SMOG POLLUTION DURING SUMMER IN
XIGU INDUSTRIAL AREA, LANZHOU

Beijing HUANJING KEXUE XUEBAO [ACTA SCIENTIAE CIRCUMSTANTIAE] in Chinese Vol 6
No 3, Sep 86 pp 334-342

[English abstract of article by Chen Changhe [7115 7022 0735], et al., of
Lanzhou University; Ren Zhenhai [0117 7109 3189], et al., of the Chinese
Research Academy of Environmental Sciences]

[Text] The characteristics of photochemical smog in the Xigu industrial area,
Lanzhou, have been studied. The results suggest that under the control of
slightly high pressure at a low atmosphere layer following a high-altitude
trough, high ozone concentrations appear. The thick smog often occurs in
summer at noon after rain when the atmosphere is stable, the wind velocity
low and the weather fine. The photochemical smog which forms over the Xigu
area covers more than 10 km². The daily fluctuation of ozone concentration
is related to the diurnal change in solar radiation and characteristics of the
boundary layer.

9717

CSO: 4009/3038

NEW BIOLOGICAL ENGINEERING BASE BEGINS OPERATION

Beijing RENMIN RIBAO [PEOPLE'S DAILY] in Chinese 3 Aug 87 p 4

[Article: "Shanghai Biological Engineering Test Base Built Quickly; Achievements Scored in Research and Development of New Biological Techniques"]

[Text] One year after laying the foundation for one of the national key construction projects during the Seventh 5-Year Plan, the Chinese Academy of Science's Shanghai Biological Engineering Experimental Base, progress has been smooth in many aspects of construction work, and research and development of new biological techniques is proceeding apace, a number of achievements having been scored. Since ground breaking on 24 May 1986, progress on construction of the base has proceeded fairly rapidly, thanks to the energetic support provided by national departments concerned and Shanghai municipality. As of early July 1987, the 8 story experimental building had been roofed, and construction in accordance with plans was also underway for the intermediate test building, the combination industrial plant, the library, the animal house, and various living facilities. Plans call for completion of all capital construction by the end of 1988. The completed sections have been inspected and found to meet design specifications for quality.

The base's research and development work is also gradually moving ahead. Currently the base already has 90 scientific research personnel who are working from the existing work foundation and expertise to actively change the direction of research and development on new biological techniques. High level research technicians are in charge of work on gene engineering, polypeptide synthesis, biological transformation, microorganism fermentation, and protein purification.

During the past year, the base has strengthened cooperation with research institutes concerned, giving expression to the role of intermediate links. For example, with guidance and cooperation from the Shanghai Pharmaceutical Institute, the base has researched and developed threonine gene engineering; in cooperation with the Shanghai Botanical Institute, it has done research and development on gene engineering for young animal diarrhea pain vaccines [sic]; it has worked together with the Shanghai Institute of Biochemistry on the building of solidified enzymes and solidified cell techniques; and it has cooperated with the Shanghai Institute of Cytology on the large scale culturing of mammalian cells, etc.

After more than a year of work, the base has produced new saccharomyces in cooperation with the Shanghai Botanical Institute; it has worked together with the Shanghai Physiological Institute on research to produce kangbu [2123 6752] substance monoclonal antibodies; and it has worked with the Yunnan Microbiology Institute in research on molasses alcohol fermentation waste liquor to produce single cell proteins. These three scientific research achievements have been evaluated and approved and are now being promoted for application or for further experimentation.

9432

4008/2029

NEW MALE CONTRACEPTION TECHNIQUE

Beijing RENMIN RIBAO [PEOPLE'S DAILY] in Chinese 15 Aug 87 p 4

[Article: "China Pioneers New Technique For Male Contraception That the United Nations World Health Organization Plans To Promote Worldwide"]

[Text] Shanxi Provincial People's Hospital director and chief medical doctor, Zhao Shengcai [6392 3932 2088], recently developed a new male contraception technique known as the "the Reversible Vas Deferens Injection Block Method." Myriad clinical cases show a better than 99 percent effectiveness rate in averting pregnancy for this method.

A KEXUE BAO [SCIENCE JOURNAL] report said that Zhao Shengcai had worked on this new male contraception technique for more than 10 years, scoring successes in nearly 300 practical experiments on monkeys, rabbits and dogs. It is a liquid that hardens to form a block within 2 minutes after being injected into the vas deferens that possesses the right amount of plasticity and smoothness, and is completely biologically compatible. Following the injection, blocking or opening may be done as needs require, providing flexibility and freedom. Furthermore, the surgical procedure is safe, reliable, and causes little pain.

The advent of this scientific research achievement marks a major advance in male contraception that puts an end to the need for surgical ligation of males that has been practiced for nearly 100 years, and it also surmounts the problem of the irreversibility of vasectomies. As a result, male contraception has become more scientific and more ideal. Following evaluation and approval, experts concerned unanimously feel that this achievement has reached advanced international standards.

This achievement has been spread to more than 20 provinces and cities in the country. Recently the World Health Organization of the United Nations also sent experts on a special trip to Taiyuan in Shanxi Province to observe and to examine the new male contraception technique pioneered by Zhao Shengcai and its practical effectiveness. The World Health Organization intends to promote this scientific achievement worldwide within the near future.

9432

CSO: 4008/2029

PYROLITIC CARBON HEART VALVES DEVELOPED

Beijing RENMIN RIBAO [PEOPLE'S DAILY] in Chinese 13 Aug 87 p 4

[Article by Correspondents Zhao Chuanming [6392 0278 2494] and Ma Jiyuan [7456 4423 0337]: "China-Manufactured Artificial Heart Valves Remarkably Effective. More Than 1,000 Patients Restored To Health During 10 Years of Clinical Use"]

[Text] The artificial coronary valve successfully developed by the Lanzhou Carbon Plant has been used during nearly 10 years of clinical use in the surgical replacement of the heart valves of more than 1,500 patients, who have been restored to health.

Heart valves include the mitral valve, the tricuspid valve and the aortic valve, which resemble three sluice gates for the flow of blood through the heart that open and close with each beat of the heart. When a valve is defective, it cannot open and close elastically or it cannot open and close completely because of a narrowing of the valve, and this impairs the normal pumping of blood by the heart. Those suffering from mild valve defects lose ability to work, and those suffering from severe valve defects lose their lives. Statistics from parties concerned show China has upward of approximately 1.4 million people suffering from coronary disease. The only way of treating such a disease at the present time is to replace the heart valves with heart valves from hogs and cattle. However, these valves last for only approximately 10 years. In 1978, the Lanzhou Carbon Plant successfully developed a permanent mechanical coronary valve made of pyrolitic carbon. This artificial heart valve has the virtues of biological compatibility, anti-coagulance, elastic opening and closing, ability to withstand wear and tear, no degeneration, no change of shape, and light weight. Simulation experiments show it to have a useful life of more than 100 years. The artificial heart valves developed by the Lanzhou Carbon Plant have been used in more than 50 hospitals throughout the country to provide artificial heart valves to more than 4,000 people in a more than 90 percent surgical success rate.

A female worker in the Honggu District of Lanzhou was the first patient to receive a Chinese-made artificial heart valve replacement in 1979. Not only was her health restored, but she gave birth to a boy 6 years ago. She said delightedly that since the heart valve replacement operation, there have been no abnormal reactions, and that she goes to work and does housework with a lot of energy.

9432

CSO: 4008/2029

NEW SURGICAL HEMOSTAT HAILED

Beijing RENMIN RIBAO [PEOPLE'S DAILY] in Chinese 3 Aug 87 p 4

[Article: A hemostatic material that is able to stop blood within 5 minutes and that can be absorbed into the human body was recently developed successfully in Beijing"]

This white silk-like S-100 absorbent hemostatic material was successfully developed by ranking engineer Xue Digeng [5641 6611 1649] and assistant engineer Zhang Meixin [1728 9485 2450] of the Beijing Textile Science Institute. They used an exceptionally pure reprocessed fiber as the raw material, which was processed to form a substance that has physical, physiological and chemical properties that make it effective in stopping blood. Because it is highly soluble, gradually becoming a lower carbohydrate that is absorbed by the human body, it does not have to be removed from the body after use.

This hemostatic material has been used clinically a total of 312 times for a 96.3 percent effectiveness rate at the Beijing Tuberculous Research Institute, Beijing Municipal Hospital Number 6, Friendship Hospital, and Xuanwu Hospital. Standards for the stopping of blood during surgical procedures require that the material used show results within 5 minutes, be effective within 10 minutes, and lose effectiveness beyond 10 minutes. In surgical procedures where there is severe bleeding that cannot be easily stopped, results in stopping blood should be apparent within 10 minutes. In cases where it was used, the hemostatic material stopped blood within 2 to 3 minutes, on average, and was able to stop bleeding of relatively small wounds within 1 minute. The hemostatic material is non-toxic, odorless, and can be readily stored, carried and used. It is also low in cost. Certain Chinese medical experts believe it to be a rather ideal hemostatic material.

9432

4008/2029

NEW TECHNIQUE FOR TYPING BLOOD PLATELETS APPLIED CLINICALLY

Beijing RENMIN RIBAO [PEOPLE'S DAILY] in Chinese 10 Aug 87 p 4

[Article: "Shanghai Successfully Develops New Technique For Checking Blood Platelets. Platelet Typing Being Applied Clinically. Reliable Theoretical Basis; Broad Application; and Meets Advanced International Standards"]

[Text] Did you know that blood platelets have types? A new achievement of the Shanghai Municipal Blood Transfusion Research Institute shows mismatching of blood platelet types can produce adverse reactions in blood transfusions. The institute has successfully developed a new technique for checking blood platelet antigens and antibodies, namely, the solid phase immunity serology test (or SPIA for short), thereby solving the difficult problem of diagnosing and treating platelet immunocytopenia in blood platelet typing research and blood platelet infusion therapy.

Shanghai hemologists and immunologists believe the theoretical basis for these research achievements to be reliable and strongly scientific, that they have broad application, and that they meet advanced international levels. In addition, these results enable blood platelet typing to be applied clinically.

Platelets are an important component of blood; however, research on them has lagged far behind research on red and white corpuscles, mostly because the methodology has been difficult. In recent years, quite a few scholars both in China and abroad have bent efforts to methods for measuring blood platelet antibodies, but most of the methods have left much to be desired in terms of practicality, sensitivity and operation.

The Shanghai Municipal Blood Transfusion Institute's Blood Type Reference Laboratory Director, Wu Guoguan [0702 0948 0342], and other technical personnel have worked for 3 years on this measurement method, which is highly sensitive, can be easily duplicated, and can be performed simply without the need for special apparatus and reagents. Most laboratories can use this method on a large volume of blood specimens.

Information provided shows that the Shanghai Municipal Blood Transfusion Institution, in cooperation with hospitals concerned, has to conduct further research on the SPIA technique, specifically with regard to the distribution in the Han Race of blood platelet specific antigen PLA-1 and the frequency of Bak-a. The gene frequency first reported internationally was 0.958 for PLA-1 and 0.774 for Bak-a

HIGH PERFORMANCE LIQUID CHROMATOGRAPHIC ESTIMATION OF AFLATOXIN B₁ AND ITS METABOLITE AFLATOXIN M₁

Shanghai SHANGHAI YIKE DAXUE XUEBAO [ACTA ACADEMIAE MEDICINAE SHANGHAI] in Chinese Vol 14 No 3, May 87 pp 226-228

[English abstract of article by Chen Ruiqun [7115 6904 5028], et al., of the Department of Biochemistry, Faculty of Basic Medical Sciences, Shanghai Medical University]

[Text] This paper describes a method for determining micro-quantities of AFB₁ and AFM₁ by a reverse phase HPLC with a fluorometric detector. The method is sensitive, with lower limits of detection as low as 500 pg of AFB₁ and 50 pg of AFM₁. The percentage of recovery for AFB₁ and AFM₁ by HPLC from intentionally contaminated corn and urine samples is between 80 and 85 percent.

In addition, three of eight samples of corn were positive for AFB₁ at a concentration of 0.645 ng to 1.774 ng/g from Fushui County, which has a high incidence of cancer. Urinary excretion of AFM₁ by inhabitants from this high risk area after ingestion of the corn was assayed. Three of the nine 24-hour samples were positive. One exceeded 1 ng/ml of urine, while the other two were below 50 pg. This technique may be particularly useful in epidemiologic studies regarding the possible relationship between chronic aflatoxicosis and cancer.

9717

CSO: 4009/3025

AFLATOXIN B₁ USE IN RADIOIMMUNOASSAY

Shanghai SHANGHAI YIKE DAXUE XUEBAO [ACTA ACADEMIAE MEDICINAE SHANGHAI] in Chinese Vol 14 No 3, May 87 pp 185-188

[English abstract of article by Liu Yinkun [0491 6892 0981], et al., of the Department of Biochemistry, Faculty of Basic Medical Sciences, Shanghai Medical University; Xu Dadao [1776 6671 6670], et al., of the Department of Nutrition and Food Hygiene, School of Public Health, Shanghai Medical University]

[Text] Antibodies against AFB₁ were obtained after multiple-site injections of bovine serum albumin-AFB₁ conjugate into rabbits. The greatest specific binding efficiency of the antibody for AFB₁ is 70~80 percent. The sensitivity of radioimmunoassay (RIA) for AFB₁ is between 0.46~2.3 ng. The retrieval rate of AFB₁ by RIA from intentionally contaminated serum and rice is between 70 and 80 percent.

Detailed methods for the preparation of the conjugate, immune serum and methods for antibody titer determination are described.

9717

CSO: 4009/3025

SCIENTIFIC, TECHNOLOGICAL, CULTURAL POLICIES REVIEWED

40080099 Tianjin KEXUE XUE YU KEXUE JISHU GUANLI [SCIENCE OF SCIENCE AND MANAGEMENT OF S&T] in Chinese No 7, Jul 87 pp 11-12

[Article by Lao Hansheng [0525 3352 3932]: "China Searches for a Modern Scientific, Technological, and Cultural Policy"]

[Text] There are two requirements for scientific and technological [S&T] development: social demand and competition, on the one hand, and the completeness, openness, and diffusion of S&T itself, on the other. Both requirements are largely determined by man. Of the many man-made factors, a very critical one is the rulers' S&T policy. In China, long subject to tight centralization, the S&T policy and the cultural policy have often been fused, forming a scientific, technological, and cultural policy.

This article analyzes China's historical scientific, technological, and cultural policy from the perspective of philosophy and, on that basis, puts forward a few observations on the two major current policies of opening to the outside world and deregulating qualified personnel.

(Center) Scientific, Technological, and Cultural Policy Reviewed

1. Evolution of Traditional Scientific, Technological, and Cultural Policy and Its Characteristics.

The Qin and Han Dynasties were a time when a unified feudal state appeared and became consolidated. It was during that period that the foundation was laid for a multifaceted feudal scientific, technological, and cultural policy that revolved around culture; encouraged science, technology, and culture as well as the development and nurturing of personnel; and inherited cultural heritage. Building on this basis, and through uninterrupted development in the Three Kingdoms, Wei, Jin, Northern and Southern Dynasties, all the way to the Sui and Tang eras, the traditional scientific, technological, and cultural policy was continuously perfected. At the same time, the country's traditional S&T also reached the peak of its glory. After the Song and Yuan Dynasties, the traditional Chinese scientific, technological, and cultural system gradually declined from the early Ming Dynasty onward to the Opium War until it degenerated into a barrier to scientific and cultural progress. Looking back at the scientific, technological, and cultural policies pursued by the feudal society dynasty after dynasty for over 1,000 years, they shared some amazing similarities in their basic characteristics and formed a continuous whole despite the fact that each had its own special features. In

general, the traditional scientific, technological, and cultural policy had the following major basic characteristics:

1) All policies took the form of royal decrees. The monarchy was supreme. It was an autocratic system in the traditional rule-of-man mold where policy-making was a monopoly.

2) The consistency between basic state policies and the scientific, technological, and cultural policy reached a high degree.

3) The policy system clearly favored culture at the expense of S&T. A good deal of attention was paid to the selection and training of bureaucrats, but the development and nurturing of S&T personnel were ignored. Of the six subjects in the imperial examination in the Tang Dynasty, for instance, the two most popular were "classics" and "jinshi," while "mathematics" in the S&T field was little noticed.

4) Modern policy analysis divides policy-making into seven stages: gathering information, putting forward proposals, law-making, citing legal provisions, implementation, evaluation, and termination. The traditional Chinese scientific, technological, and cultural policy, however, lacked the evaluation stage. Also missing were information and proposal. Thus policy-making was highly haphazard.

5) The collection of books was taken seriously, while the dissemination and popularization of culture received scant attention. The scientific, technological, and cultural policy was closely related to the policy of keeping the people in ignorance.

6) Rulers in successive dynasties liked to continue the policies of the previous dynasty and were loath to make changes or reforms. Hence the strong policy continuity and stability. It may be said that their conservatism and resistance to change made for a super-stable structure.

7) Confucianism was the creed, and the classics the orthodox culture. The annotation and proofreading of classics was encouraged.

8) Imperial power was closely linked to astronomy and the movement of heavenly bodies. Human events were compared to astrological phenomena, resulting in an independent and peculiar "astronomical policy."

9) The court was overburdened with obsolete policy-making mechanisms so that when the government was faced with situations like a peasant uprising, policy adjustments were urgently needed to discard some old institutional shackles. But the traditional system had a rare recuperative capacity and soon reasserted itself.

10) Utilitarianism was stressed and the superiority of the group was preached. Individual development was frowned upon. There was a good deal of interest in the writing of biographical history and the scientific, technological, and cultural policy was guided by ethics.

2. Changes in Modern Scientific, Technological, and Cultural Policy

The Opium War was a turning point in China's scientific, technological, and

cultural policy as well as Chinese society. China's modern scientific, technological, and cultural policy became established during the Westernization Movement.

Compelled by domestic trouble and foreign invasion, and prompted by the desire to help the Qing Dynasty continue its rule and prevent the demise of the Chinese nation, the people in power during the Westernization Movement had no choice but to reform traditional policies by "making peace abroad and making political reforms at home." The guiding principle of the movement was to "learn from the barbarians to control the barbarians and make foreign things serve China." The general policy during the movement was determined by the movement's guiding principle and essentially called for the "adoption of Western learning and the making of Western things" on the basis of traditional policy. (Footnote 1) ("Westernization Movement," Book 2 p 24)

The Westernization Movement ultimately failed and its scientific, technological, and cultural policy also went bankrupt. Although the movement came to an end, the scientific, technological, and cultural policy which came into existence during that time survived. This policy was totally different from its traditional counterpart in basic substance and paved the way for the modern policy. Needless to say, while the new scientific policy which emerged in the Westernization Movement differed from the traditional policy, it was far from revolutionary.

(Center) Some Reflections on the Modern Scientific, Technological, and Cultural Policy

The modern Chinese scientific, technological, and cultural policy embodies both the regularity and variability of historical development and has emerged through a unique tortuous process. The traditional policy going back thousands of years has not been completely abandoned or overhauled. Its negative aspects still adversely affect the modern policy, as illustrated by the scientific, technological, and cultural policy during the 10 years of turmoil. The incompatibility between the traditional Chinese culture and modernization manifests itself today in the conflicts between the old policies and new policies, primarily the following: 1) between the improvement of the economic and political status of intellectuals and the entire social tradition and social life; 2) between overall policy stability and the need for timely adjustment; 3) between the need for a network-like social structure and the concept of great unification in the traditional culture; 4) between the equality principle that pervades a network-like society and the traditional view that society was a hierarchy; 5) between the rule of law and the traditional notion of rule of man; 6) between the need for creativity and a conservative mentality; 7) between openness and closeness; 8) between the democratic system and autocracy; 9) between selecting the pioneer type of people and selecting mediocrity; 10) between scientific competition and the doctrine of the mean; 11) between the full development of individuality and the "traditional virtue" of subordinating the self to the group; 12) between practice and theory; 13) between material interests and ethics; 14) between the cultural tradition of developing and consuming related S&T and the principles of frugality and opposing luxury; and 15) between improving the scientific cultural level of the entire people and the traditional conservative, anti-foreign, anti-change psychology. Of these 15 policy conflicts, the most notable are issues related to the policy of opening to the

outside world and qualified personnel development.

Opening to the outside world is the party's major strategic policy in the new era aimed at developing the economy and speeding up the four modernizations. Although the policy was put forward with economic construction in mind, it is also applicable to the development of a socialist scientific and technological culture. First of all, a new technological revolution is sweeping the world today. New industries revolving around electronics, new materials, and the exploitation of new energy sources are growing furiously. At the same time, scientific cultural theory is developing by leaps and bounds. Faced with all this, we can no longer pursue construction and scientific research behind closed doors. Instead we should broaden our vision and adopt extensively other nations' strengths for our own use. Second, China can make use of advanced foreign S&T to remedy its current weaknesses in S&T. By opening to the outside world, China may bridge the gap between itself and developed nations. Finally, opening to the outside world makes us understand the current state and future trends of the scientific and technological culture in the world. Throughout its history, China's scientific, technological, and cultural policy has changed frequently, now open, now closed. Practice proves that closeness would only result in backwardness. Certainly, in the open process, we will also inevitably let in some bad influences, particularly in the cultural area. But provided we uphold the four cardinal principles, we should be able to learn the good while staying clear of the bad. For this reason, China must follow through with its open policy to the very end. Otherwise, the failure of the scientific policy of the Westernization period would be repeated.

About personnel development and the policy toward intellectuals. There is a good deal of in the nation today. The CPC Central Committee has emphasized time and again the need to take knowledge and intellectuals seriously, noting that respecting knowledge and qualified personnel is a strategic principle and basic national policy in the new era. Owing to the influence of the feudal traditional policy and longstanding "leftist" policy, there is an acute shortage of qualified personnel who can tackle modernization and the new technological revolution. On the other hand, the qualified personnel in our midst are neither taken seriously nor given the right jobs. In some localities and sectors, they are even discriminated against, squeezed out, or attacked. If this state of affairs is not ended, modernization will be doomed and meeting the challenge of the new high-tech revolution will remain empty talk.

To resolve the conflict between a scarcity of intellectuals and a high demand, China must pay attention to the development of qualified personnel as well as implement the policy on intellectuals. Data show that the average age of the members of the academic departments of the Chinese Academy of Sciences is close to 70. Those under 50 are few and far between, while octogenarians are well represented. Selecting, promoting and nurturing qualified personnel through a variety of channels, therefore, has become a top priority today. The development of qualified personnel should include their rational utilization and protection. According to Comrade Zhou Enlai, misusing intellectuals and assigning them to the wrong positions is extremely wasteful. We should manage to do the following: 1) conduct investigations to find out what the situation is. Only when we fully understand the intellectuals' conditions can we put them to use and assign them the proper jobs; 2) make

sure an intellectual is put to work doing what he was trained to do. Despite their knowledge, intellectuals cannot be expected to know or be able to do everything. In assigning them jobs, therefore, we must make sure there is no mismatch between training and work; and 3) give them power as well as responsibilities so that they can give full play to their expertise. These three things cannot be achieved by relying on a heightened consciousness alone. There must be administrative orders and legislation on how to utilize and protect qualified personnel.

Loopholes and weaknesses still exist in China's existing scientific, technological, and cultural policy. How to further improve it? This is one question that policy-makers should ponder carefully. In my opinion, the basic question is not one of simply preserving the traditional policy or Westernization. Instead we should focus on policy synthesis at a higher level. Toward that end, we must boldly smash the trammels of the old policy and absorb the essence of Western as well as our own policies to devise a policy suited to national conditions. There is a blind optimism among policy workers that we must be concerned about. It is the notion that the West is adept at analysis, the East, at synthesis; that since the trend in modern science is toward synthesis, the time has now come for the East to shine, and that our traditional policy approach of emphasizing the whole and neglecting the part can now find its moment in the sun. Actually this is a mistaken viewpoint. Scientific development unfailingly goes through a circular process, from division to synthesis to division and back to synthesis again. Division is the foundation for synthesis, while the latter is the prelude to further division. China's traditional synthesis philosophy is at a different level from modern synthesis. They mean entirely different things and should not be lumped together.

Policy analysis is an important way to bring about scientific policies. Only by stepping up policy evaluation and proposal can we make policies that are less haphazard.

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NATIONAL DEVELOPMENTS

LEGISLATING INTERNATIONAL COOPERATION IN SCIENCE, TECHNOLOGY

40080099 Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENCE OF SCIENCE AND MANAGEMENT OF S&T] in Chinese No 7, Jul 87 pp 15-17

[Article by Ke Lifa [2688 0500 0127]: "Legislating Sino-Foreign Cooperation in S&T"]

[Text] Objectives of Legislating International S&T Cooperation

The development of modern science and technology [S&T] has become internationalized.

International S&T relations refer to the web of rights and obligations resulting from cooperation between the major parties to international law in scientific research, technological development, and S&T management. Practice proves that international S&T cooperation is a major way to develop modern S&T because in the modern world, S&T progress in every nation is subject to a plethora of constraints in such areas as history, geography, resources, funds, traditional technology and S&T personnel. Even scientifically advanced nations with well-developed market economies cannot reign supreme or monopolize leadership throughout the entire S&T field.

China is a developing socialist nation. Comrade Deng Xiaoping says, "Our goals are peace and development." S&T modernization holds the key to socialist modernization. And international cooperation is pivotal in S&T development.

Cooperation is not an end. In fact, competition pervades the entire process of S&T cooperation. Our objectives are these: first, pool the advanced and traditional technology of different nations and, through international cooperation, achieve new breakthroughs in research and development [R&D] by combining knowledge in novel ways; second, sharing other nations' natural resources and securing the environment, conditions, objects, and information indispensable to scientific research and technological development; third, bring together the S&T talent of all nations and races and exploit the collective intelligence of the entire human race; fourth, make use of foreign funds and equipment to meet the ever-rising capital and other material requirements of R&D; and fifth, study and learn from advanced foreign experience in S&T management in order to improve the standard of S&T management and decision-making in China. In short, we must achieve S&T progress through international cooperation and put S&T at the service of

economic development and social progress to contribute to mankind.

To achieve these objectives, we need to devise a correct development strategy, policies and principles and make use of the expertise, intelligence, and creativity of vast numbers of S&T personnel. Moreover, we need to establish a management system and create a good external and domestic environment through legislation to effectively protect China's legitimate rights and interests in international S&T cooperation. Accordingly we must examine the legislation issue in international S&T cooperation to the year 2000.

(Center) Background to Legislating International S&T Cooperation

Modern S&T development has the following major characteristics:

1. S&T is becoming highly specialized and highly inter-disciplinary at the same time. On the one hand, there is growing division of labor between different disciplines and specialties. On the other hand, interdisciplinary and inter-specialty linkages have proliferated.

2. R&D costs are going up endlessly, while the economic and social returns of applying scientific achievements to production have been even more remarkable.

3. All nations stress two objectives in their S&T development strategy: one, step up basic research, go all out to develop high tech, increase the S&T reserves, and vie for a foothold on the frontier of science, and two, pay attention to the practical applications of S&T in social production and expedite the conversion of S&T achievements into new productive forces.

The trends and forms of international S&T cooperation will be determined by the direction and level of modern S&T development. It is foreseeable that by 2000 technology as an intangible commodity will be even more valuable, information will become an increasingly precious asset, and natural resources will assume an additionally important position in international S&T cooperation. S&T achievements will be protected by a more and more elaborate intellectual property rights system. At the same time, international S&T cooperation will be a network of lateral and vertical interactions in which both governments and private citizens take an active part.

(Center) The Present State of Legislation on International S&T Cooperation

As part of China's drive to build up its socialist legal system, the legal regulation of international S&T cooperative relations must uphold the four cardinal principles and follow the principles of reform, economic vitalization, and opening to the outside world. Basically, we must, first of all, continue to open to the outside world and promote international S&T cooperation and exchange. Second, we must safeguard national sovereignty, maintain China's socialist public order, and protect its legitimate rights and interests as a legal person as well as the legitimate rights and interests of its citizens. Third, we must adhere to proletarian internationalism and support developing nations' legitimate quest for S&T progress.

Accordingly, the legal means of regulating international S&T cooperation include international public law, international private law, and domestic legislation. International public law here refers to the international conventions and treaties governing S&T cooperation between nations as well as

multilateral and bilateral S&T cooperation agreements. International private law refers to legal provisions that regulate civil legal relations between different national legal persons and citizens. But since international private law is mainly concerned with the resolution of jurisdictional conflicts where foreign nations are concerned, it is in the final analysis a question of domestic legislation.

S&T cooperation is different from economic intercourse. It involves protecting intellectual property rights, sharing S&T achievements, keeping intelligence and information secrets, developing natural resources, exchanging professional personnel, and preventing illegal monopolies, etc. China still lacks a comprehensive legal system to regulate these special matters and remains largely dependent on the internal rules and policies of such agencies as the State Science and Technology Commission and the Ministry of Foreign Affairs to regulate international cooperation. This state of affairs is extremely ill suited to international S&T cooperation, which is already becoming quite extensive. It is critical therefore that we speed up legislation on scientific and technological matters involving foreign nations or citizens.

(Center) Strategy for Legislating International S&T Cooperation

To sum up, we must seriously study and intensify law-making as it affects foreign S&T cooperation if we are to further the policy of opening to the outside world, actively develop international S&T cooperation and exchange, promote S&T progress, and accelerate socialist modernization. This task should proceed according to a plan step by step under the leadership of the legal organs of the National People's Congress and the State Council.

Legislating S&T cooperation to the year 2000 consists of two aspects. On the one hand, we must participate actively in international scientific and technical affairs, be a party to and join the necessary international conventions, carry out an independent foreign policy, advocate the cooperative principle of equality and mutual benefit, and safeguard national sovereignty and the legitimate rights and interests of Chinese citizens and legal persons in international S&T relations. On the other hand, based on China's S&T development strategy and the needs of S&T structural reform, we must step up the formulation of laws and regulations involving foreign S&T cooperation with the aim of gradually forming a complete body of law. Every effort must be made to ensure that by the end of the century, foreign S&T cooperation legislation that correctly embodies the party's and nation's open foreign policy and is compatible with the characteristics of modern S&T development is in place at the three levels of S&T work, namely the main battlefield of serving economic construction, high tech development planning, and the strengthening of basic research as appropriate. Toward that end, the formulation of the following laws and regulations should be put on the agenda:

1. Technology import regulations

The import, absorption, and assimilation of advanced foreign S&T is a key aspect of China's S&T development strategy as well as an important form of economic and technical trade in the world today. It is vital to China's effort to improve its S&T standard and achieve economic takeoff. In 1981, the State Council promulgated the "Provisional Regulations for the Import of

Technology and Equipment," followed by the enactment of the "Provisional Regulations for the Examination of Technology Imports" by the State Science and Technology Commission and State Import and Export Commission. On 24 May 1985 the State Council announced the "Management Regulations of the People's Republic of China for Technology Import Contracts." These administrative regulations have been a boost to technology import. However, as reform intensifies, the open policy gets under way, and domestic S&T capabilities increase, these two sets of regulations are no longer suited to the new circumstances. As many new experiences need to be institutionalized by being written into law, there is a need to draw up a uniform technical import law or regulations to clarify the principle and policy of technology import, lay down the procedures and requirements of technology import feasibility studies, set up a system for the absorption, assimilation, and dissemination of imported technology, establish an import management system in line with China's socialist conditions and its S&T development strategy, and hence expedite its industrial and technical development.

2. Technology Export Control Regulations

China is exporting a significant amount of technology today. As socialist modernization matures, technology exports will grow steadily. At stake are vital national economic and technical interests. What is needed is a prompt effort to formulate appropriate technology export control regulations that will lay down the basic principles and policy of exporting technology, define the scope of technology exports, set up review procedures and a license system for such exports, and control technology export contracts. The regulations should effectively sharpen China's edge in S&T and heighten its competitiveness, on the one hand, and continuously expand and protect the national interests in the international technical market, on the other.

3. Regulations for Sino-Foreign Cooperative Research

Cooperative research includes cooperative research in natural science, the joint development of applied technology, and joint research in S&T management and soft science. This new form of cooperation developed in the last 2 or 3 decades and will be the major form of cooperation by the year 2000. There is at present an impressive number of cooperation agreements, official and private, between China and other nations. Chinese scientists and engineers are cooperating with foreigners in an array of areas such as basic research, applied research, developmental research, industrial testing, commercial production, and the dissemination of research results. There is as yet no law which defines how R&D achievements and risks are to be shared and what the rights and obligations of each cooperating party are. Thus Sino-foreign cooperative research law or regulations should be a basic part of the legal system regulating international S&T cooperation. We should set about establishing such a system as soon as possible so that cooperative research can take place on the sound principle of equality and mutual benefit to facilitate S&T progress and the building of the spiritual and material civilizations by mankind.

4. Regulations Governing S&T Secrets

S&T secrets involve national security and vital social interests. At a time when the country is opening to the outside world, how to keep such secrets as

national S&T intelligence, information, and data is an urgent issue. S&T secret regulations should spell out the principles and policies governing S&T secrets, their scope, and their classification, and establish a national S&T secret management system. In particular, such regulations should contain clear provisions regarding supervision and inspection procedures and the legal liability of revealing official secrets due to carelessness or leaking secrets.

5. A Legal System to Protect Resource Advantage

As international S&T cooperation intensifies, such natural resources as animal and plant species, microbe species, rare minerals, special water samples and soil samples, special geographical conditions, and unique cultural heritage become an important aspect of scientific research and technological development. Resource abundance is a key factor in S&T development in China and places the country in a strong position when it comes to foreign S&T cooperation. A string of appropriate legal systems is required to ensure that resources are developed rationally and used properly in cooperation with foreign nations.

6. A Legal System to Protect Intellectual Property Rights

A legal system should be set up to protect computer software rights, semiconductor chip rights, animal species rights, data rights, and other rights accruing to owners of new knowledge and to resolve problems arising from the sharing of rights and interests in international cooperation.

7. A Legal System for Space and Oceans

There should be legislation to regulate changes arising from the new technological revolution that affect space and oceans. A legal system should be established to regulate S&T rights and interests involved in outer space, the ocean floor, polar regions, remote-sensing, and spacecraft, and reconcile rights and obligations in international cooperation.

8. General Principles in International Private Law that Relate to S&T Cooperation

International S&T cooperation is the bundle of rights and obligations that more than two national legal persons or citizens agree upon in such areas as scientific research, technological development, and S&T management. Apart from the usual general principles in international private law, there should be special principles to resolve any legal disputes. China's current international private law is far from complete. Thus it is necessary that we draw up general legal principles to govern China's foreign S&T cooperation. These principles should be a summation of the nation's civil law as it relates to foreign relations, particularly its experience in international S&T cooperation, and, taking international practice into consideration, include appropriate provisions on the differentiation of foreign law, the determination of the point where Chinese and foreign law meet, the citing of precedents, the preservation of public order, thereby living up to the complex situation in international S&T relations, protecting the legitimate rights and interests of Chinese legal persons and citizens in S&T cooperation, and promoting the healthy development of international S&T cooperation.

China's legal system is an ordered hierarchy consisting of different levels of laws and regulations of varying legal authority, from law and administrative regulations to departmental rules to local regulations. Legislating international S&T cooperation is a new task still in its exploratory stage. It must proceed actively but cautiously. Depending on the circumstances, sometimes we may enact a law and sometimes we may start out with an administrative rule or departmental regulation and, after a trial period, review the experience before upgrading it into a law. We believe that with the joint efforts of China's S&T workers, legal workers, and people engaged in foreign relations, China will certainly be able to establish a legal system for international S&T cooperation with Chinese characteristics to benefit the nation's socialist modernization and human progress.

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NATIONAL DEVELOPMENTS

IDEAS, SUGGESTIONS FOR 'SPARK PLAN'

40080099 Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENCE OF SCIENCE AND MANAGEMENT OF S&T] in Chinese No 7, Jul 87 pp 23-25

[Text] Comrade Ji Quanfu [1323 0356 1381] of the science and technology commission of Shaoxing, Zhejiang Province, notes that in reviewing the implementation of the "spark plan" last year, the municipal commission drew up a tentative plan for the gradual creation of a "spark plan" technology-intensive area:

-- overall guiding principle

Further open up channels to enable science and technology to flow toward the countryside so that the rural economy would develop healthily using science and technology. Specifically, these five integrations must be achieved: between old (projects) and new (projects); long-range (planning) and short-range (planning); key test sites and broad areas (demonstration and dissemination); soft and hard (technical software, personnel training, and product development), domestic and foreign (domestic sales and foreign trade, using local resources and establishing lateral associations). Set priorities. Tackle the straightforward jobs first, then the more difficult tasks. Make the best use of the situation. Do whatever is practical or feasible.

-- set development goals for the Seventh 5-Year Plan

-- main projects to be tackled, starting in 1987

-- The key to success lies with proper implementation. Fulfill the spirit of the second national "spark plan" work conference and further improve understanding. Incorporate the "spark plan" into municipal or county economic and technical plans. Accomplish projects already included in the "spark plan" so that they bear fruit and turn out qualified personnel as soon as possible, thereby disseminating technology throughout the countryside. Strengthen lateral associations and promote joint scientific research and production bodies of all forms. Conduct research on "spark plan" policies and management.

Comrade Hu Xiongbiao [5170 7160 1753] of the science and technology information office of Xiushui County, Jiangxi Province, believes that doing a successful job in intelligence and information service goes a long way toward ensuring that the "spark plan" will result in the diffusion of science and technology [S&T] throughout the countryside. Thus information departments are

duty bound to drum up support for, advocate, and publicize the "spark plan."

A rural information department primarily serves the vast numbers of township and town enterprises, small and mid-sized enterprises, and "two households and one body" (specialized households, key households, and joint business bodies) in the countryside. Thus intelligence and information services are indispensable to the implementation of the "spark plan."

In his opinion, intelligence and information services must accomplish the following three tasks for the "spark plan:" 1. act as a consultant. Conduct good feasibility studies that can serve as a basis for the formulation of a "spark plan;" 2. act as a vanguard. Provide information and diligently serve as an intermediary; and 3. function as a "blower." Provide an intelligence service and promote the dissemination of technology in the countryside.

Comrade Liu Shouzheng [0491 1343 6927] of the science and technology commission of Heilongjiang Province argues that the "spark plan" is a demonstration project that may lead to the creation of a climate. Since the goal is a commodity economy, attention must be paid to market research. Reviewing "spark plan" projects in the absence of systematic and scientific market studies, quantitative analyses and forecasts will result in haphazard and risky projects. To enable the "spark plan" to develop healthily, we must learn from foreign marketing research and put market forecasting on a sound footing. Foreign informational materials should be collected, including materials on special equipment, new technical developments, market supply and demand, etc.

Comrade Xie Xianwen [6200 0341 2429] of the science and technology commission of Da County in Sichuan Province thinks that S&T loans should be the prime source of funds for "spark plan" projects.

There are many constraints on S&T development and local economic invigoration, but the most important and decisive is funding problems. Comrade Xie Xianwen thinks that the solution is to raise funds from a broad range of sources and use the limited funds available rationally. A good approach is to secure S&T loans.

Borrowing for S&T projects needs a positive environment and involves ideological, organizational, and policy work.

1. Improve understanding and create an atmosphere where people would conscientiously make available loans for S&T projects and where finance and banking departments would take the initiative to coordinate their acts with S&T departments and do their best to help the "spark plan," genuinely supporting it financially, helping it in their work, and facilitating it in their management.

- 3 [as published]. Draw up policies to encourage projects by providing S&T loans, subsidizing the interest rates for such loans, offering tax exemption, and providing for loan repayment.

3. Establish a coordinating agency to ensure that a loan is available to every "spark plan" project.

He also mentions a number of points that should be noted in securing S&T loans.

First, funding sources. Specifically, there are six funding sources for technological development. First, a special S&T borrowing target issued by the bank at the higher level; second, the local banking agency sets aside part of the credit target issued by the bank at the higher level and designates it as S&T loans; third, the local finance agency uses the development fund to support undeveloped areas as part of the working capital and reserve funds; fourth, the depreciation funds at the disposal of the economic commission that comes from state-owned enterprises; fifth, a portion of poverty relief funds at the disposal of the agricultural trade office and civil administration department; and sixth, part of three S&T funds allocated by the science and technology commission above. These funds are channelled into the S&T lending program through the bank credit system. They are lent to specific "spark plan" projects by the specialized banks concerned through special personnel and separate bank accounts.

Then there is the question of project selection. "Spark plan" loans should favor technical development projects in mainstay industries that have significant trickle-down effects and can contribute greatly to local economic prosperity.

About loan management, on the one hand, we must channel funds from the many different sources into the "spark plan." On the other hand, we must respect the autonomy of the various departments involved and make full use of their strengths and characteristics. Overall we demand that each department does its own thing and assumes responsibility for its own tasks. While there should be joint planning, there must also be division of labor to improve the returns on technical investments steadily.

Comrade You Qingquan [3266 3237 3123] of Hubei Correspondence University believes that

Personnel development in general consists of two stages: education and utilization, which interact with each other. The more thorough education is, the brighter the prospects that people will be put to better use.

An important part of "spark plan" is to nurture and train without delay a corps of rural S&T personnel equipped with one or two practical skills and basic managerial know-how.

Given China's circumstances, if it is to turn out a crop of usable modern personnel with the minimal amount of money in the shortest time possible, it must take pains to establish a mechanism combining rural education with practical economic development. This kind of education should be production-oriented instead of culture-oriented and applications-oriented instead of theory-oriented. It should be geared to the development of knowledge, not its preservation. Gradually it will become an educational system suited to rural economic development. As reforms in the rural industrial structure gain ground, rural education and intelligence development should have the following new characteristics:

1. rural economic development requires the support of a range of disciplines.

The rural economy is dependent on many disciplines for its own development.

2. vigorously develop vocational education in several specialties to equip the trainees with one or two practical skills. This is the major way to develop expertise in the countryside to date.

3. The contents of rural education and intelligence development must be determined by local economic development trends, expanding as local circumstances demand. Different personnel training methods may be used on an experimental basis to expedite regional economic development and the utilization of local strengths.

4. market variability and the expansion of managerial autonomy have led to greater initiative and more choices regarding the mastering of technical knowledge, especially vocational knowledge.

Judging from the present situation and long-term development needs, rural educational reform should start with the integration of education with the economy, focusing on the nurturing of a new generation in the countryside. In the short run, we should concentrate on the development of intellectual resources among adults, at the same time coming to grips with systematic education in the villages. In the medium and long run, our objective should be the development of secondary school education and higher education, the improvement of practical professional education, and the gradual creation of a closely-knit rural educational network, complete with mechanisms whereby education, the economy, and society can promote each other.

In his written presentation, Comrade Yao Xuejin [1202 1331 6955] of the science and technology commission of Zhijiang County, Hubei Province, puts forward two brand-new concepts: "technical training by objective" and "reserve technical training." Both will greatly help us strengthen personnel training so that they can play an even more important role in the "spark plan."

He believes that personnel training can be either training by objective or reserve technical training.

Technical training targeted at a specific objective is known as technical training by objective, while a training program aimed at building up technical reserves is called reserve technical training. In the case of the latter, the technology involved is not immediately applicable but may well prove useful in the light of forecasts.

The two training approaches have their own strengths and weaknesses. Personnel who have gone through training by objective are equipped to handle technical work relating to the set objective. Training is short in duration and pays off quickly. Teachers for this kind of training are readily available. It is easily put together with little investments. However, the short duration of the training and the fact that it is objective-specific mean that the trainees have a narrow range of expertise, display little creativity in their work, and are slow to absorb new knowledge. Reserve technical training, on the other hand, does not have a specific objective. It requires its trainees to master a broad range of basic knowledge that they can put to good use in their future work, so they are more adept at absorbing new knowledge and converting it to production technology. This kind of training,

nevertheless, lacks existing teaching materials, is harder to organize and more time-consuming, requires more capital, and takes longer to pay off.

Practically speaking, technical training by objective is more important and is the most effective way to make the rural economy flourish. Yet reserve training prepares technical forces needed in the future and must not be ignored.

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NATIONAL DEVELOPMENTS

SCIENCE & TECHNOLOGY INTELLIGENCE CENTER COMPLETED

Beijing RENMIN RIBAO [PEOPLE'S DAILY] in Chinese 3 Jul 87 p 4

[Article by Xinhua News Agency from Beijing dated 2 July: "Science & Technology Intelligence Center Completed - Networking with S&T Intelligence System in the World"]

[Text] China's largest science and technology intelligence base--Chinese Science and Technology Intelligence--was completed and passed inspection yesterday. It will become the national center for the world science and technology intelligence system.

According to an introduction, the size of the building and the range of services of this center are the largest in Asia. It is responsible for the planning and coordination of the technical intelligence industry in China. It is a national center for the storage, indexing and research of science and technology documents. The newly constructed "center" occupies a total of over 60,000 square meters. It consists of five departments: reading service system, computer center, intelligence research and functional department, audio-visual information and exhibit hall, and technical documentation publishing department. The "center" has more than 30 spacious open-rack reading rooms and private study rooms to simultaneously accommodate more than 1,500 people for reading and research. Its main storage facility can hold 4,000,000 volumes of technical documents. It also has a large computer center, capable of handling automated intelligence processing. It is equipped with a Chinese character information processing system and is expected to provide online retrieval on 10,000 subjects per year.

12553

CSO:4008/2020

NATIONAL DEVELOPMENTS

ADVANCES IN BIOMEDICAL ENGINEERING REPORTED

Shanghai WEN HUI BAO in Chinese 5 Jun 87 p 1

[Article by Correspondent Zheng Shanlong [6774 0810 7893] and Reporter Ye Younong [0673 0642 4767]: "Rapid Progress in Biomedical Engineering in China; Shanghai- Miami Biomedical Engineering Discussion Meeting Held"]

[Text] Although China had a late start in biomedical engineering, it has already reached the leading edge in some areas. This is the news from the "Shanghai - Miami Biomedical Engineering Meeting" which began yesterday. Vice Mayor Xie Lijuan [6200 7787 1227] attended the opening ceremony.

Biomedical Engineering is used in diagnostic and therapeutic instruments, artificial organs and biological materials. The polypropylene hollow fiber artificial lung developed by Fudan University, Xinhua Hospital and Shanghai First City Tuberculosis Prevention and Treatment Institute has been widely employed in China. Since the second half of 1985, Xinhua Hospital alone used it in over 300 cases. Without this artificial lung, the surgical mortality rate in the past was 50 percent. Using this new artificial lung, none of the patients who underwent this low temperature surgery died. This is at the leading edge in the world. The polytetrafluoroethylene artificial blood vessel and heart repair sheet developed at Xinhua Hospital have already reached the international level in early 1980.

Most of the medical instruments, including electrocardiographs, electroencephalographs, electromyographs, and heart monitors, are manufactured in China. The quality and variety of laser instruments are at the advanced level in the world. Laser is not only used in the treatment of diseases but also used as a surgical knife to remove tumors.

In addition, artificial heart valves, artificial kidneys and artificial joints are widely used in China. Shanghai Second Medical College is the first in China to use domestically made materials and artificial heart valves to develop an artificial heart (artificial blood pump). An animal experiment was done last year on the left ventricle of a calf. The calf lived for 18 days. It was improved this year and another animal study with a calf is underway. The calf has survived for 22 days as of yesterday.

The Shanghai - Miami Biomedical Engineering Discussion Meeting was initiated by the Shanghai Advanced Continuing Education Institute and Miami University in the U. S. The contents of the meeting include biomedical engineering of the cardiovascular system, respiratory system, gastrointestinal system, and oral cavity. A dozen experts led by Dr. Kling [phonetic] and Associate Dean Samuel Lee of the School of Engineering of Miami University came to Shanghai to attend the meeting.

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NATIONAL DEVELOPMENTS

RESULTS OF COMBINED STUDY OF WESTERN, TRADITIONAL MEDICINE

Beijing RENMIN RIBAO in Chinese 27 May 87 p 3

[Article by Ai Xiao [5337 4562]: "Outstanding Results Obtained by the Armed Forces in Combined Study of Western and Traditional Medicine - 46 Accomplishments in 5 years"]

[Text] Reporter Ai Xiao learned in a worksnop on combined western and traditional medicine in the armed forces on 26 May that many experts and professors in traditional medicine in the armed forces were very successful in using modern science and technology to inherit, sort and improve the theory and experience in traditional medicine. Since 1982, the entire armed forces received 46 technical accomplishment awards in traditional or combined medicine above the second class award level.

In clinical research, Hospital No. 208 improved the cure rate of polio sequel from 44.1 percent to 86.3 percent by combining western and traditional medicine. Hospital No. 261 used acupuncture to treat over 1400 hysteria paralysis patients. The cure rate is 97 percent. Hospital No. 268 successfully used acupuncture and cupping to treat psoriasis. In Nanjing General Military Hospital, a traditional medical doctor Sha Xingyuan [3097 2502 0997] dialectically treated over 200 arrhythmia patients with good results. Hospital No. 302 used a traditional medicine formula based on the root of herbaceous peony to treat chronic hepatitis. The hospital in Troop No. 52847 combined western and traditional medicine to treat vasculitis with good results. The Air Force General Hospital effectively used combined medicine to treat diabetic limb necrosis.

In the area of military medicine and combat injury treatment, the Institute of Military Medicine discovered new drugs to prevent and treat nerve toxins, organic phosphorus poisoning, and acute radiation illness. Some units developed plasma substitutes such as pomelo peel gel, apple gel, papaya gel and starfish gel. They are new alternatives in treating combat shock patients. In the self-defense war against Vietnam, traditional medicine was used to treat wounds inflicted by fire arms, fractured bones, internal bleeding in the eye, disposition gangrene, residual hemothorax, deafness due to explosion and shock. It was also used in anesthesia.

In the theoretical study of traditional medicine, some units employed pulse pattern monitors to collect a great deal of data on patients in pregnancy and shock, as well as with coronary heart disease and heart failure. The data also includes the rare pulse pattern called the "ghost pulse." The relation between tongue pattern and physiological factors and coronary disease was

studied with a tongue surface blood flow monitor in order to aid the diagnosis of such diseases.

In the area of drugs, we developed extracts from ginseng and Chinese caterpillar fungus to combat aging and enhance immunity. Pills were developed to treat coronary artery disease and cerebral thrombosis, as well as snake poisoning.

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CSO:4008/2020

NATIONAL DEVELOPMENTS

NEW RURAL MEDICAL, HEALTH SYSTEM ESTABLISHED IN HUNAN

Beijing RENMIN RIBAO [PEOPLE'S DAILY] in Chinese 26 Jun 87 p 3

[Article by Cao Guanghuai [2580 0342 2547] and Zou Yun [6760 0061], both reporters of the Xinhua News Agency: "Hunan Establishes a New Rural Medical Care and Health System"]

[Text] Hunan is in the process of reforming its rural medical and health system. More than 80 percent of the village health stations have been transferred to the local government from county health bureaus. This move stimulated the enthusiasm of the local government and the people.

Village and town health stations are the pivot in the rural medical and health system. In the past, all local health stations were under the direct jurisdiction of the county health bureaus. Personnel, finance and resources are controlled by the county. Local party officials and government were not directly involved. In the winter of 1985, Lieutenant Governor Wang Xiangtian [3769 0686 1131] spent more than 2 months with comrades in the health department to conduct a survey in 6 counties in northern, central and southern Hunan. He felt that this rigid system was not only detrimental to the management and development of the system but also hinders the implementation of prevention and health maintenance at the basic level. Last April, the Hunan Communist Party Committee and the people's government presented the new management system in which the local health stations are to be managed by the local government. It is a two tier system, county and village, and the local government has the primary responsibility.

According to the person in charge at the provincial health office, many towns and villages have appointed a deputy Communist Party Secretary or an assistant administrator to be responsible for health related activities. Many towns and villages have included the construction of health facilities in their development plans. They are investing to improve the building and equipment. The health station located at Hetangpu outside Zhuzhou had been losing money for years. It occupied 460 square meters of space and had very primitive medical equipment. The volume of business was very low. It was in a semi-active state. After the local government took over, they poured in 500,000 yuan to build 2,760 square meters of space for living and medical treatment. It has 100 regular beds and it is equipped with electrocardiograph, B ultrasound, 200 mA X-ray machine and biochemical test apparatus. It also attracts people in the health profession with favorable conditions and sends medical staff to school. The standard of care has significantly improved and the volume of business has increased 5 - 6 fold.

After the towns and villages controlled the local health stations these facilities were immediately reorganized based on the local realities. Financial assistance is given to activities related to disease prevention based on the quality and quantity of the effort. The employees are evaluated and compensated for overtime. They either charge for their services or charge a small fee per person. Thus, the problem of "eating from the common pot" is eliminated. In addition, the funding for protection and prevention of diseases in this "cooperative medical network" is secured. According to an incomplete statistical report, 2,700 village health offices or medical stations were set up last year. More than 85 percent of the villages in Hunan have health facilities.

The county health bureaus, after transferring the local stations to the local authorities, are relieved from the day to day operations and can concentrate on their business. They are responsible for the training of medical personnel and organization in the county. They are also responsible for giving guidance and performing inspections. Each county runs a health professional technical school on the high school level which accepts graduates from junior high. The program is 3 years. The students must pay their own way. The school does not allocate any future jobs for the students. The purpose is to train country doctors. Last September, more than 1,500 students were accepted into the first 31 such professional schools. The provincial education committee has already included this type of schools into the professional technical school category.

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CSO:4008/2020

LARGE NATIONAL FUNDING SLATED FOR WATER POLLUTION CONTROL

Beijing RENMIN RIBAO [PEOPLE'S DAILY] in Chinese 14 Jun 87 p 4

[Report by Wu Jincai [0702 6930 2088]: "State to Invest Big in Treating Water Pollution"]

[Text] It was revealed by the State Council Environmental Protection Committee that during the period of the "7th Five Year Plan," China will allocate 12.5 billion yuan toward controlling water pollution.

According to a survey, the water quality in the mainstreams of China's Yangtze, Yellow, Pearl, and Songhua Rivers is still at a grade 2 or 3 standard for national surface water, but the water quality in river segments near cities is universally polluted by industrial run-off and domestic sewage, and the water quality for sources of urban drinking water has declined everywhere. The Liao River has actually become a river of effluent. Lakes and reservoirs such as Tai Hu and Dian Chi have become rich in nutrients. The State Office of Environmental Protection has predicted that by 1990 total pollutants admitted to the Yangtze, Yellow, Pearl, Huai, and Hai Rivers and to the drainage areas of the Luan, Songhua, and Liao Rivers will increase from 25.7 billion square meters to 33.8 billion square meters. This will have an increasing affect on the pollution of drinking water sources and the destruction of water environments and ecological environments.

For these reasons, the state has determined the fundamental task for controlling water pollution over the next few years: we will strive to control the water quality and pollution in the seven major rivers, and to retard the tendency toward continued deterioration; we will protect the water quality in the sources of drinking water, as well as water quality at spawning grounds for important aquatic produce resources, feeding and fattening grounds, over-wintering grounds, and at primary channels of migration; we will bring the water quality of river segments that are the sources for urban drinking water and that of major water transport channels, as well as that of reservoirs and lakes, up to a national grade two standard.

The state has also determined that we will increase investment in controlling major lake and river pollution, and will gradually build new urban sewage treatment plants in cities on the banks of main streams, which will reduce the quantity of discharged pollutants.

12586

CSO: 4008/2025

STANDING COMMITTEE URGES STRONGER ANTI-POLLUTION MEASURES

Beijing RENMIN RIBAO [PEOPLE'S DAILY] in Chinese 14 Jun 87 p 4

[Text] In their consideration of the "PRC Laws for the Prevention of Atmospheric Pollution (draft)", delegates to the 21st session of the Standing Committee of the 6th National People's Congress made a strong appeal for taking the prevention of atmospheric pollution as a major item regarding the health of the people and later generations. They hoped that by revising and proclaiming laws for the prevention of atmospheric pollution as quickly as possible, they would not let this problem continue!

In deliberations by the separate groups, committee members came to recognize that the prevention of atmospheric pollution and the protection and improvement of the environment are major actions that cannot be put off. Committee member Xu Dixin [6079 3321 2450] said that atmospheric pollution is a very serious problem, and when certain industrial sectors seek only after production quantities and output value without consideration of the pollution brought by burning coal, this is a great threat to the physical health of the population. By the year 2000, gross industrial output for China will quadruple, and if we do not pay attention to pollution control, by that time the pollution will also have quadrupled, and then what will we do? Committee member Deng Jiaqin [6772 1367 4440] has said that the atmospheric pollution in several cities throughout the country has become more serious, that it threatens the physical health of the public, that it disturbs the normal life and work of people, and that if we do not soon adopt powerful measures and strict laws and discipline and strengthen environmental management, there will be no end of disasters. Committee member Han Zheyi [7281 0772 0001] has said that one of the major pollutants in the atmosphere is coal soot, and that prevention in this area should receive attention. From the present perspective, from leaders down to the public, the seriousness of atmospheric pollution has not been sufficiently acknowledged. For this reason, publicity on these matters must continue to be promoted. The State Planning Commission will include the prevention of atmospheric pollution within the scope of its planning, and will be responsible for the necessary funding. Governments at all levels must be diligently responsible, and everything must be handled in a thorough manner. If these things are not done well, we must determine who is responsible.

Some committee members suggested that we should make compliance with pollution prevention and clean-up standards one measure of whether a factory should go into production. The committee members Ouyang Yi [2962 7122 3015], Song Yiping [1345 0001 1627], Gu Jingsheng [6253 2529 3932], and Mei Yi [2734 4135] believe that all production facilities already completed but not in compliance with standards should be brought under control within a certain time limit. As for newly constructed factories, facilities to control pollution should be designed and constructed together with the main body of the project, and these things should be put into use together. All that is ruled as not in compliance by environmental protection departments will not be allowed to

begin or to be used, which will prevent the generation of new sources of pollution.

Many committee members pointed out in their speeches that if we are to resolve the problems of atmospheric pollution, we must strengthen the enforcement of laws, and must carry out these laws strictly. Committee members Su Buqing [5685 2975 7230], Song Chengzhi [1345 2110 1807], Zhang Zhixiang [1728 5268 4382], and Ren Xinmin [0117 2450 3046] believe that after we have formulated laws, the key will be the execution of those laws. Otherwise, laws lose their significance. Not only should violators be punished and fined, but those responsible for complying with those laws should be identified.

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CSO: 4008/2025

NATIONAL DEVELOPMENTS

CHINESE GEOGRAPHICAL INFORMATION SYSTEM ESTABLISHED

Beijing RENMIN RIBAO [PEOPLE'S DAILY] in Chinese 27 May 87 p 4

[Report by Kong Xiaoning [1313 2556 1337]: "China Establishes Natural Resources and Environmental Information System"]

[Text] As soon as the technician pressed the switch, the computer screen began to fill with a three-dimensional image of the normal water levels of a certain section of the Yellow River. With another press of a button another three-dimensional image of the same region of the river appeared to the viewer: when water levels of the Yellow River are lower than 6 meters from the top of the dam, a large area of land within the dam will be flooded. Chinese and foreign specialists in Beijing for the International Conference on Information Systems who were seeing this scene in the Laboratory for the Natural Resources and Environmental Information System of the Chinese Academy of Sciences [CAS] could not help but exclaim their praises.

This laboratory, which went into operation last year, has taken on several key projects in science and technology for the "7th Five Year Plan" and major scientific research tasking for the state, and it has as well developed broad international cooperative research.

With the approval of CAS, this laboratory will open to the domestic and international public in June, to become one of four major state laboratories that have become available domestically and internationally.

The geographical information system is called the Natural Resources and [Environmental] Information System in China, and it uses modern technologies such as computers, artificial intelligence, and remote sensing to collect various information relevant to natural resources and the environment, as well as to process that information. This can provide a scientific basis for overall decision making and for project construction. It is an important technological guarantee for bringing science and democracy to decision making.

According to statements by experts, although China began to establish its natural resources and environmental information system later than others, certain accomplishments have been made. The National Territorial Information System set up in 1985 has already begun to be applied in project designs such as the selection of lines for railways and communications transmission networks. Since last year, China has also established an economic information system. Other national level information systems, such as those for agricultural resources, forestry resources, mining resources, conservation, and the natural environment, have begun to draw up data dictionaries and set up data collection stations or data bases.

At the International Conference on Geographical Information Systems, President of the Chinese Academy of Sciences, Zhou Guangzhao, disclosed in his opening remarks that during the period of the "7th Five Year Plan," scientific

research will begin on mapping of the drainage areas for the Yangtze and Yellow Rivers, on the problems of conservation in the loess plains and of deserts in the Sanbei shelter-forest, as well as on conditions regarding urban ecology and environmental changes. The establishment of the geographical information system will aid in the development of this research.

The International Conference on Geographical Information Systems is held periodically by the International Geographical Society. Although China became a member of the Society in 1984, this was the first time we had hosted an international conference of this sort. Experts from more than ten nations came from countries and regions such as the United States, England, Canada, Japan, and Hong Kong. Among these were internationally first-rank experts such as (Ma xi er [7456 1585 1422]), chairperson of the International Geographical Society Data Processing Committee, and (Lin jing jun zhi [2651 0064 0193 3112]), head of the Asian Remote Sensing Society.

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CSO: 4008/2025

MEASUREMENT OF CURIE TEMPERATURE FOR Nd-Fe-B PERMANENT MAGNETS AT LOW MAGNETIC FIELD

Beijing ZHONGGUO XITU XUEBAO [JOURNAL OF THE CHINESE RARE EARTH SOCIETY] in Chinese Vol 4 No 4, Dec 86 pp 17-20

[English abstract of article by Xue Ronghua [5641 2837 5478], et al., of Nanjing University]

[Text] The Curie temperature of a Nd-Fe-B permanent magnet was measured with an alternating magnetic field down to 2.5 Oe. The principle of this method is to measure the variation of susceptibility of magnetic materials with temperatures near the Curie point. When a piece of an Nd-Fe-B sample with a M pick-up coil is put in a weak alternating magnetic field $H_e = H_0 \cos \omega t$, if ω is high enough and the heating or cooling speed is not too fast, the induced electromotive force in the M-coil can be expressed as $V = k \omega H_0 \frac{\kappa}{1+N\kappa} \sin \omega t$, where κ is a constant related to the geometry of the coil and the sample, N is the demagnetizing factor of the sample, κ is the susceptibility of the magnetic material of the sample. After selected frequency amplification and detection, V becomes a direct current signal $V(\kappa)$, which is related to κ . Then a $V(\kappa)$ - T plot can be obtained with an X-Y recorder. When the temperature reaches the material's T_c , a very sharp drop appears in the $V(\kappa)$ - T curve, which spans only a few degrees centigrade. Therefore, by this drop, the value of T_c can be determined rather precisely.

The Curie temperature T_c is defined as the temperature where spontaneous magnetization $M_s \rightarrow 0$ occurs. To determine M_s , one should measure the magnetization curve in the high field and make use of the law of approach to saturation, which is rather time-consuming. For simplicity, people often determine T_c by extrapolating $M(H)$ - T or the $M^2(H)$ - T curve to $M(H)=0$ or $M^2(H)=0$ at a certain high magnetic field, but in this case an error in T_c results since at temperatures near T_c , $M(H)$ in a high field is higher than M_s and at T_c , $M(H)$ is not equal to zero. Therefore, this leads to a higher T_c than the true value. The higher the magnetic field, the larger the error. In the present method, the sample experiences only a very low alternating magnetic field, so the magnetic material is in a state very near to spontaneous magnetization. The effect of the applied magnetic field is then avoided. Experimentally, $V(\kappa)$ drops almost vertically at the Curie temperature, so a comparatively good T_c value can be obtained.

As a verification of the present method, the Curie temperature of nickel was measured using this method. The results agree very well with the accepted value, 358°C. The present method and the authors' apparatus are, therefore, considered reliable. (Paper received 24 Dec 85.)

REFERENCES

- [1] Sagawa M., Fujimura S., Togawa N., Yamamoto H. and Matsuura Y., J. Appl. Phys., 1984. 55. 2083.
- [2] Burzo E., Oswalt E., Huang M. Q., Boltich E. and Wallace W. E., J. Appl. Phys., 1985. 57. 4107.
- [3] 张茂才、马德青、呼琴、刘世强, 中国稀土学报, 1985, 3(3). 48.
- [4] Yang Yingchang et al., J. Appl. Phys., 1985. 57. 4115.
- [5] Sinnema S., Radwanski R. J., Franse J. J. M., De Mooij D. B. and Buschow K. H. J., JMMM, 1984. 44. 333.
- [6] 戴礼智, 金属材料研究, 1985. 11 (3). 1.

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CSO: 4009/1118

INVESTIGATION OF NEW MAGNESIUM-FREE RARE EARTH NODULIZER

Beijing ZHONGGUO XITU XUEBAO [JOURNAL OF THE CHINESE RARE EARTH SOCIETY] in Chinese Vol 4 No 4, Dec 86 pp 53-59

[English abstract of article by Zhang Jun [1728 6511], et al., of Huazhong University of Science and Technology]

[Text] In this paper a new magnesium-free rare-earth nodularizer, RE-Ca-Ba-Al-Sb (RCBAS), has been developed which may become a rival of the RE-Mg nodularizer. The spheroidizing ability of RCBAS for cast iron with different sulfur contents and castings of various sectional areas has been studied under laboratory and production conditions. The effect of RCBAS on the degree of undercooling of molten iron and also the influence of individual principal constituents are described in comparison with REMg and RESi. The crystallization and structural characteristics of the cast iron treated by these three types of nodularizer are also discussed. Test results show that RCBAS is a very effective nodularizer. In one case, the cast iron melted in an induction furnace or cupola containing 0.034-0.091 percent S was treated with 1.34-1.89 percent RCBAS and cast into a keel block, with a yield of spheroidal graphite of more than 95 percent. The graphite particles formed are small, round and uniform, and their number per square millimeter is more than 300. As observed under SEM, the surface of the graphite particles is level and smooth, and in some cases a few bedded structures are also present. High strength cast ductile iron can be produced from Z15 pig iron with RCBAS treatment alone, producing a tensile strength and elongation of more than 70 kg/mm² and 2 percent respectively. This type of ductile iron is less sensitive to the sectional area of casting. The structure and properties of $\phi 35$ - $\phi 220$ mm ductile iron samples originally treated with RCBAS are superior to those treated with REMg and RESi. The shortcomings of the common rare-earth nodularizer, including a high degree of undercooling, narrow optimum range of amount added and aptness to distortion of graphite, can be overcome by the employment of RCBAS. Other advantages of RCBAS are: it is simple and safe in operation, there is less pollution released to the environment and less energy consumption due to elimination of normalizing of casting. Test results also indicate that the structural model of "matching of different kinds of elements" proposed in this paper for the composition of RE nodularizer is an effective way to improve the spheroidizing ability and to develop a new generation of rare-earth nodularizers. (Paper received 19 Oct 85.)

REFERENCES

- [1] 徐光迪, 钢铁, 1965, 9(8-9), 60.
- [2] 杨云峰, 球铁, 1982, (4), 11.
- [3] 吴德海, 稀土, 1981, (2), 58.
- [4] 森田志郎, 铸件, 1968, 40(3), 296.
- [5] B. V. Kovacs, AFS Transaction, 1982, 90, 79.
- [6] O. Knacke, Zeitschrift fur Metallkunde, 1979, 70, 9.
- [7] 关洪野, 球铁, 1978, (4), 72.

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CSO: 4009/1118

EFFECT OF Ce ON COMPOSITION OF OXIDE FILM OF Fe-Cr ALLOY

Beijing ZHONGGUO XITU XUEBAO [JOURNAL OF THE CHINESE RARE EARTH SOCIETY] in Chinese Vol 4 No 4, Dec 86 pp 61-66

[English abstract of article by Li Bei [2621 8951], et al., of Baotou Rare Earth Research Institute]

[Text] The composition changes of oxide films on Fe-Cr alloys have been investigated by EPMA. The results are as follows:

When a Fe-15Cr alloy is oxidized at 1000°C in air, the concentration of Cr ions in the surface layer of oxide film increases gradually from 35.3 wt percent after 1 hour to 63.0 wt percent after 40 hours, while that of Fe ions decreases from 30.9 wt percent to 2.21 wt percent after the same periods. The concentrations of Cr ions close toward the stoichiometric composition of Cr_2O_3 .

When a Fe-15Cr-0.3Ce alloy is oxidized at 1000°C in air for 1 hour, three types of different regions can be observed in the surface of the oxide film. The first type of region is bright, containing 0.66 wt percent Ce, and the contents of Cr and Fe are 34.4 and 28.1 wt percent respectively, which are similar to those of the Fe-15Cr alloy. The second type of region is dark, containing 2.09 wt percent Ce, with contents of Cr and Fe being 56.4 and 4.57 wt percent respectively, and many fine particles of Ce-rich oxide are distributed over the entire region. The third type of region is Fe-rich with Ce oxide hillocks, the initial oxidation product of the Fe-Ce phase present at the alloy surface. Due to the presence of the hillocks, the total quantity of Fe-rich oxide in the surface layer of the film is not less than that on the Fe-15Cr alloy. As oxidation occurs, the compositions of all three regions are close to that of Cr_2O_3 .

When the two alloys are oxidized at 1100°C, the characteristics of changes in composition of surface layers of the films are similar to that at 1000°C. However, Cr-rich oxide films are formed quite quickly on both Fe-30Cr and Fe-30Cr-0.2Ce alloys oxidized at 1200°C in air. For instance, the surface layers of their films contain 62.7 wt percent Cr, 1.62 wt percent Fe and 61.9 wt Cr, 2.36 wt percent Fe, 0.26 wt percent Ce respectively after 0.1 hour.

When the oxidation period is prolonged, a degradation of Cr-rich oxide films appears on the Fe-15Cr and Fe-30Cr alloys, and the amount of Fe-rich oxides increases, existing in the form of a surface layer on the film or blocks inside the film or nodules. However, the residual Cr-rich oxide is quite pure, and concentrations of Cr and Fe ions are always more than 61.0 wt percent and less than 1.0 wt percent respectively. Ce can strongly inhibit the occurrence of the above-mentioned Fe-rich oxide, but cannot decrease the concentration of Fe ions dissolved in the Cr-rich oxide.

Ce ions are enriched in the surface layers of the Cr-rich oxide film. The concentration of Ce-ions in the surface layer of the oxide film of Fe-15Cr-0.3Ce alloy oxidized at 1100°C for 40 hours and Fe-30Cr-0.2Ce alloy oxidized at 1200°C for 100 hours is 1.19 and 0.77 wt percent, but is 0.03 and 0.12 wt percent, respectively, in the middle of the films. (Paper received 22 Aug 85.)

REFERENCES

- [1] Whittle D. P. and Stringer J., Phil. Trans. R. Soc. Lond., 1981, A295, 309.
- [2] Hindam H. and whittle D. P., Oxide. Met., 1982, 18, 245.
- [3] 李曙, 颜玉新, 高怀荪等, 中国腐蚀与防护学报, 1985, 5, 100.
- [4] 颜玉新, 李曙, 理化检验 (物理分册), 1984, 20(5), 14.

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CSO: 4009/1118

PREPARATION OF NEODYMIUM METAL BY MAGNESIUM CATHODE ELECTROLYSIS-VACUUM
DISTILLATION METHOD

Beijing ZHONGGUO XITU XUEBAO [JOURNAL OF THE CHINESE RARE EARTH SOCIETY] in
Chinese Vol 4 No 4, Dec 86 pp 73-76

[English abstract of article by Ren Chunxu [0117 4783 4872], et al., of
Hunan Institute of Rare Earth Metal Material]

[Text] This article proposes a method for the preparation of neodymium metal
by the magnesium cathode electrolysis-vacuum distillation method, and describes
and discusses the technological conditions which affect the preparation of the
Mg-Nd alloy by electrolysis. The current efficiency of Nd during electrolysis
is 65-70 percent, and the direct recovery of neodymium metal is 80-90 percent.
The paper also discusses the technological conditions for removing magnesium
and refining metallic neodymium by the vacuum distillation method. (Paper
received 4 Feb 86.)

REFERENCES

- [1] 赵敏寿、赵奇金、唐定骧, 中国稀土学报, 1983, 1(2), 41.

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CSO: 4009/1118

ROLE AND DISTRIBUTION OF La IN Co-BASE SUPERALLOY GH188

Beijing ZHONGGUO XITU XUEBAO [JOURNAL OF THE CHINESE RARE EARTH SOCIETY] in Chinese Vol 4 No 4, Dec 86 pp 45-52

[English abstract of article by Zeng Bingsheng [2582 3521 0524], et al., of the Central Iron and Steel Research Institute]

[Text] In this paper the role and distribution of La in the Co-base superalloy GH188 are investigated. The distribution ratio of La between the matrix and M_6C carbide phase is about 9:1, and La is concentrated mainly on the grain boundary. Most of the lanthanide in superalloy GH188 is La_2O_3 and La_2O_2S . The oxidation behavior of the GH188 alloy in air over the temperature range of 900 to 1200°C for periods from 0 to 100 hours has been studied by means of X-ray analysis and SEM. Results show that the general parabolic characteristic of oxidation is observed. The addition of La can increase the oxidation activation energy of this alloy, thereby increasing its antioxidation property. X-ray analysis indicates that the surface scale consists mainly of (Co, Ni)- Cr_2O_4 , with certain amounts of Cr_2O_3 and βCo . The diffusion of Cr ions in Cr_2O_3 is obviously the governing factor of the oxidation rate. La can considerably improve the densification, continuity, stability and adhesiveness of the oxide scale of this alloy. Results also indicate that the La content of 0.028-0.120 percent can increase the permanent stability and ductility. (Paper received 15 Jul 85.)

REFERENCES

- [1] Simmons W. F., «AD 72661P» 1971.
- [2] Herchenroeder R. B. et al. Metal Progress, 1972. 101(3). 63.
- [3] Herchenroeder R. B. et al., Cobalt, 1972. 54(3), 3-13.
- [4] Alloy Digest, Co-32. 1971.
- [5] 普里丹采夫 M. B., 杂质和稀土元素对合金性能的影响, 北京, 中国工业出版社, 1968. 113-116.
- [6] Свистунова Т. В., Металловедение и Термическая Обработка, 1976. 10, 13.
- [7] Kubaschewski O. Hopkins B. E., «Oxidation of Metals and Alloys» London, Butterworths Scientific Publications.
- [8] 戴丹孚等, 金属学报, 1984. 20 (1) A47.

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CSO: 4009/1118

ANALYSIS OF IMAGE RECOVERY EFFECT IN MIXERS WITH IMAGE REJECTION

Hefei ZHONGGUO KEXUE JISHU DAXUE XUEBAO [JOURNAL OF CHINA UNIVERSITY OF SCIENCE AND TECHNOLOGY] in Chinese Vol 17 No 1, Mar 87 pp 77-85

[English abstract of article by Tan Jiang [6151 3068] of the Department of Radio and Electronics]

[Text] In this paper a quantitative analysis is given of complicated mixer circuits with image rejection based on the author's previous work. A necessary and sufficient condition to achieve image recovery is demonstrated. The profit resulting from image recovery is estimated quantitatively. (Paper received 20 May 86.)

REFERENCES

- [1] 谈江, 微波混频器信号流图的一种极简形式, 电子学报, 1 (1986), 95—99.
- [2] 半导体手册, 第14编“微波电路”, 科学出版社, 1979.
- [3] Wilds, R. B., Microwave Two-Phase Converters for Imageless Receivers, *Microwave Journal*, 9 (1961).

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CSO: 4009/1107

SCIENTISTS, SCIENTIFIC ORGANIZATIONS

BEIJING TO HOST BIOCHEMISTRY CONFERENCE

OW141340 Beijing XINHUA in English 1001 GMT 14 Aug 87

[Text] Beijing, 14 Aug (XINHUA)--The Beijing International Biochemistry Conference, sponsored jointly by the Chinese Biochemical Society and the China International Science and Technology Center, will be held from 17 to 22 August.

The conference, the biggest one of its kind ever held in China, is aided by the International Union of Biochemistry (IUB) and the China Association for Science and Technology.

Secretary-general of the conference Lin Qishui said at a press conference here today that more than 1,000 experts and scholars from over 30 countries and regions will participate in the conference.

Nobel prize winner Prof. A. Kornburg, from Stanford University in the U.S., president of the IUB Prof. E.C. Slater of London, Prof. Zou Chenglu from the Research Institute of Biochemistry of the Chinese Academy of Sciences, and four other leading scientists will speak at the conference.

During the conference, forums will be held on 10 topics, including the structure and function of insulin, biologically active peptide, congregated carbohydrates and reproductive biochemistry.

Chinese scientists will report their achievements in research into the structure and function of insulin, crystal structure of insulin analogues, interaction of chain a and chain b of insulin, and others.

The IUB has provided videotapes and computer software for the conference.

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